

INTERMEDIATE MACROECONOMICS PRACTICE PROBLEMS AND SOLUTIONS

Second Edition

G. Stolyarov II,

ASA, ACAS, MAAA, CPCU, ARe, ARC, API, AIS, AIE, AIAF

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Section 1

The Economics of Money and Prices

Problem 1. Which of these are basic functions of money? More than one answer may be correct.

- (a) Hedge against price inflation.
- (b) Unit of account.
- (c) Tool used for barter.
- (d) Store of value.
- (e) Medium of exchange.
- (f) Automatically appreciating asset.
- (g) Measure of one's intrinsic human worth.
- (h) The root of all evil.

Solution 1. The three basic functions of money are its usefulness as a medium of exchange, a store of value, and a unit of account. Holding money tends to be a poor decision when there exists dramatic price inflation, and money is designed to *avoid*, not facilitate, barter. Money does not always appreciate automatically in value, except in times of deflation. Furthermore, money is neither a measure of one's intrinsic human worth nor the root of evil - [Paris Hilton](#) and [St. Paul](#) notwithstanding. Thus, **(b), (d), and (e) are correct answers.**

Problem 2. Which of these are motives for holding money? More than one answer may be correct.

- (a) Speculative demand
- (b) Legal tender laws
- (c) Effective demand
- (d) Precautionary demand
- (e) Aggregate demand
- (f) Transactions demand
- (g) Exchange demand

Solution 2. The three motives for holding money are transactions demand (f) - as many everyday activities and transactions involve spending cash or writing cash - precautionary demand (d) - as money may be needed for unforeseen future contingencies, and speculative demand (a) - resulting from one's uncertainty about the value of money and other assets. Thus, **(a), (d), and (f)** are correct answers.

Problem 3. Which of these is a valid formula for L , the demand to hold money?

- (a) $L = MP$ - where M is the money supply, P is the price level
- (b) $L = P/M$ - where M is the money supply, P is the price level
- (c) $L = M/P$ - where M is the money supply, P is the price level
- (d) $L = MV$ - where M is the money supply, V is the velocity of circulation
- (e) $L = V/M$ - where M is the money supply, V is the velocity of circulation
- (f) $L = M/V$ - where M is the money supply, V is the velocity of circulation

Solution 3. The correct formula for the demand for money is $L = M/P$, i.e., **answer (c)**.

Problem 4. Which of these is true about $L(i, Y)$, the demand to hold money? Here, i is the interest rate, and Y is income. More than one answer may be correct.

- (a) $\partial L/\partial i < 0$, i.e., L_i (b) $\partial L/\partial i = 0$, i.e., $L_i = 0$
- (c) $\partial L/\partial i > 0$, i.e., $L_i > 0$
- (d) $\partial L/\partial Y < 0$, i.e., L_Y (e) $\partial L/\partial Y = 0$, i.e., $L_Y = 0$
- (f) $\partial L/\partial Y > 0$, i.e., $L_Y > 0$

Solution 4. If the interest rate i increases, this will reduce the demand to hold money, so $L_i < 0$. Thus, **(a) and (f) are correct answers**.

Problem 5. Which of these are characteristic of a gold standard as historically practiced? More than one answer may be correct.

- (a) Fluctuating foreign exchange rates.
- (b) Fixed exchange rates among different currencies.
- (c) Inflationary central bank tendencies.
- (d) Free convertibility of currencies into one another.
- (e) Fixed rates of economic growth.
- (f) Requirements for occasional explicit cooperation among governments.
- (g) Strong public distrust in the value of the national currency.
- (h) The impossibility of running perpetual trade surpluses.

Solution 5. A historical gold standard involved fixed gold parity rates in each country - which led to fixed and stable exchange rates among national currencies. So (a) is false and (b) is true. A gold standard kept inflation to a minimum and sometimes was even deflationary; it also gave central banks little discretion, so (c) is false. A gold standard required free convertibility of currencies, so (d) is true. It by no means fixed economic growth (as if anything can!), so (e) is false. The gold standard did require occasional coordination among governments, so (f) is true. Since the gold standard was not inflationary, there was no reason for the public to distrust its value, so (g) is false. David Hume's specie-flow mechanism demonstrated that, under a gold standard, perpetual trade surpluses are impossible, and so mercantilist attempts to run them were self-defeating.

Section 2

The Classical Gold Standard

Problem 6. Which of these is one of the rules entailed in the classical gold standard?

- (a) Nationalize the gold mines and extract gold at a fixed rate.
- (b) Set a target rate for growing the money supply. If GDP grows at 3% per year, the central bank should grow the money supply at 3% per year.
- (c) Fix an official gold price or "mint parity," and convert freely between domestic money and gold at that price.
- (d) Require banks to hold 100% gold reserves.
- (e) Prohibit all lending from the central bank to domestic banks.

Solution 6. The correct answer is **(c)**: Fix an official gold price or "mint parity," and convert freely between domestic money and gold at that price.

Problem 7. Which of these is another of the rules entailed in the classical gold standard?

- (a) Fix all wages and prices in terms of gold.
- (b) Threaten to retaliate against any nations that deviate from the fixed exchange rate among national currencies.
- (c) If it is impossible to convert between the national currency and gold as promised, slightly debase the coinage by adding a touch of silver to it.
- (d) Allow the common price level (nominal anchor) to be endogenously determined by the worldwide demand for, and supply of, gold.
- (e) Implement a free banking system, abolishing the central bank and removing all banking restrictions and regulations.

Solution 7. The correct answer is **(d)**: Allow the common price level (nominal anchor) to be endogenously determined by the worldwide demand for, and supply of, gold.

Problem 8. Which of these is yet another of the rules entailed in the classical gold standard?

- (a) Do not restrict exports or imports of gold by private citizens, nor impose any other exchange restriction on current or capital account transacting.
- (b) Attempt to run a consistent trade surplus in order to accumulate as much gold as possible.
- (c) Set up tariff barriers on foreign products so as to prevent gold from being redistributed to foreigners.
- (d) Require a balance of trade among all nations on the gold standard.
- (e) Require that, while gold-backed notes and goods may exchange hands, the physical gold must not leave a country's borders.

Solution 8. The correct answer is **(a)**: Do not restrict exports or imports of gold by private citizens, nor impose any other exchange restriction on current or capital account transacting.

Problem 9. Which of these are still other rules entailed in the classical gold standard? More than one answer may be possible.

- (a) Take gold out of circulation whenever price inflation occurs. Inject additional gold into the economy whenever price deflation occurs.
- (b) Back national banknotes and coinage with earmarked gold reserves, and condition long-run growth in deposit money on availability of general gold reserves.
- (c) Require the government to run a balanced budget.
- (d) Fix interest rates to correspond with the rate of growth of the gold supply.
- (e) Prohibit any agency other than a government mint from issuing coinage in gold.
- (f) If gold convertibility is temporarily suspended, restore convertibility at traditional mint parity as soon as practical-if necessary by deflating the domestic economy.
- (g) Legally bind all countries to convert between their national currency and gold at a fixed parity.
- (h) In short-run liquidity crises from an international gold drain, have the central bank lend freely to domestic banks at higher interest rates.

Solution 9. The three remaining rules of the classical gold standard are

- (b)** Back national banknotes and coinage with earmarked gold reserves, and condition long-run growth in deposit money on availability of general gold reserves.
- (f)** If gold convertibility is temporarily suspended, restore convertibility at traditional mint parity as soon as practical-if necessary by deflating the domestic economy.
- (h)** In short-run liquidity crises from an international gold drain, have the central bank lend freely to domestic banks at higher interest rates.

Problem 10. Which of these phenomena did the classical gold standard render impossible? More than one answer may be correct.

- (a) Deflation
- (b) Hyperinflation
- (c) Defaults on government debt
- (d) Barter
- (e) Free-floating currency exchange rates
- (f) Central banking
- (g) Discretionary monetary policy
- (h) Paper money

Solution 10. Deflation, debt defaults, barter, central banking, and paper money (backed by gold) can still exist under a classical gold standard, but hyperinflation, free-floating currency exchange rates, and discretionary monetary policy cannot. Thus, **(b), (e), and (g) are correct answers.**

Section 3

The Quantity Theory of Money

Problem 11. Given that M = money supply, V = velocity of circulation, P = price level,

Y = output level, which of these is the equation describing the Quantity Theory of Money?

- (a) $M/V = P/Y$
- (b) $V/M = PV$
- (c) $MP = VY$
- (d) $MPY = V$
- (e) $MV = PY$
- (f) $PV = 1/MY$

Solution 11. The correct answer is (e): $MV = PY$

Problem 12. In Assumptionland, the Quantity Theory of Money holds perfectly. The GDP of Assumptionland is 20000, and the price level is 30. The money supply is currently at 440000. What is the velocity of circulation of money in Assumptionland?

Solution 12. We use the equation $MV = PY$, rearranging it to $V = PY/M$, where $P = 30$, $M = 440000$, and $Y = 20000$. Thus, $V = 30 * 20000 / 440000 = V = \mathbf{1.3636363636}$

Problem 13. The government of Assumptionland (with economic conditions as described in Problem 12) decides to increase the money supply by a factor of 1.43. Yas is a Classical economist and believes that the models of Classical economics are perfectly reflected in the real world. Which economic variable does Yas think will be affected, and what will the new value of that variable be?

Solution 13. Classical economics holds that an increase in the money supply results in a proportional increase in the price level, leaving velocity of circulation and output unchanged. So, according to Yas, the price level P will rise to $1.43 * 30 = \mathbf{P = 42.9}$

Problem 14. The government of Assumptionland (with economic conditions as described in Problem 12) decides to increase the money supply by a factor of 3.11. Senyek is a Keynesian economist and believes that the models of Keynesian economics are perfectly reflected in the real world. Which economic variable does Senyek think will be affected, and what will the new value of that variable be?

Solution 14. Keynesian economics holds that prices and wages are sticky, so, at least in the short run, an increase in the money supply will result in a proportional increase in output. Thus, according to Senyek, P and V will remain constant and Y will increase by a factor of 3.11 to $20000 * 3.11 = \mathbf{Y = 62200}$

Problem 15. Suppose that the Quantity Theory of Money holds perfectly in Equationville. Over the past year, money supply in Equationville changed by a factor of 1.22, velocity of circulation was halved, and output increased by a factor of 4. By what factor did the price level change?

Solution 15. $MV = PY$ implies that $P = MV/Y$. So P will increase proportionally to M and V and in inverse proportion to Y . Thus, P will change by a factor of $1.22 \cdot 0.5 / 4 = \mathbf{0.1525}$

Section 4

Money and Inflation

Problem 16. Which of these concepts are mutually exclusive?

- (a) Fiscal policy and monetary policy
- (b) Monetarism and Classical economics
- (c) Real prices and nominal prices
- (d) Money illusion and money neutrality
- (e) Paper money and gold money
- (f) Reason and emotion

Solution 16. Money illusion means that people respond to nominal prices rather than real prices. Money neutrality occurs when people have no money illusion and respond solely to real economic factors. When money is neutral, nominal prices do not influence decision-making. Thus, money illusion and money neutrality are mutually exclusive, and **(d)** is the correct answer.

Problem 17. Which of these views would a Monetarist support? More than one answer is possible.

- (a) The government should never increase the money supply.
- (b) The government should increase the money supply to stimulate output and employment.
- (c) The central bank should have as much discretion over monetary policy as possible so as to enable optimal responses to each unique economic challenge.
- (d) The government should increase the money supply at a constant, predictable rate.
- (e) Inflation is always and everywhere a monetary phenomenon.
- (f) Animal spirits and irrational investment decisions by private businesses led to the Great Depression.
- (g) The Great Depression was caused by sharp drops in the money supply, influenced by a tightening of monetary policy by the Federal Reserve.

Solution 17. A Monetarist would agree with the following:

- (d)** The government should increase the money supply at a constant, predictable rate.
- (e)** "Inflation is always and everywhere a monetary phenomenon." ~ Milton Friedman
- (g)** The Great Depression was caused by sharp drops in the money supply, influenced by a tightening of monetary policy by the Federal Reserve.

Problem 18. What is seignorage?

- (a) A policy whereby the government stimulates the economy by cutting taxes and increasing spending.
- (b) The difference between taxes and government spending.
- (c) The profit from printing money to a government or a counterfeiter.
- (d) The difference between nominal interest rates and real interest rates.
- (e) The total cost of printing money to a government or a counterfeiter.
- (f) The rate at which seniors age.

Solution 18. Seignorage is **(c)**: The profit from printing money to a government or a counterfeiter.

Problem 19. What are some of the costs of inflation? More than one answer is possible.

- (a) People might find themselves in higher tax brackets without earning more in real income.
- (b) Frequent price changes impose costs on business owners who have to print new price menus.
- (c) People holding cash experience a diminution in the value of their holdings.
- (d) Wages set in nominal terms are slow to adjust, so real wages might decline.
- (e) People lose time and resources by having to make monetary transactions more frequently.
- (f) Everyday financial transactions are complicated by uncertainty about future prices.

Solution 19. All of the above are genuine costs of inflation occurring in the real world. Thus, **(a), (b), (c), (d), (e), and (f) are correct answers.**

Problem 20. Which of these is a consequence of government inflating the money supply?

- (a) Because of persistent money illusion, people continue to adhere to previous wage and price contracts despite the increase in the quantity of money.
- (b) There is a "flight to quality" - as individuals tend to hold less cash and more durable goods that do not lose their value.
- (c) Output is permanently boosted by a stimulus to aggregate demand.
- (d) A recession is more likely, especially if the government followed a deflationary monetary policy before.
- (e) Unemployment is sustainably reduced in direct proportion to the increase in the money supply.

Solution 20. The correct answer is **(b)**: There is a "flight to quality" - as individuals tend to hold less cash and more durable goods that do not lose their value.

Section 5

The Money Multiplier

Problem 21. Which of these is a valid definition for the money supply M ?

- (a) $M = CU + R$, where CU = currency, and R = bank reserves
- (b) $M = CU + D$, where CU = currency, and D = bank deposits
- (c) $M = D + R$, where D = bank deposits, and R = bank reserves
- (d) $M = CU/R$, where CU = currency, and R = bank reserves
- (e) $M = CU/D$, where CU = currency, and D = bank deposits
- (f) $M = CU \cdot R \cdot D$, where CU = currency, R = bank reserves, and D = bank deposits

Solution 21. The correct answer is **(b)**: $M = CU + D$, where CU = currency, and D = bank deposits

Problem 22. What is a name given to the sum $CU + R$, where CU = currency and R = bank reserves?

- (a) Money multiplier
- (b) Bank deposits
- (c) Reserve requirement
- (d) Money supply
- (e) Savings
- (f) High-powered money
- (g) Money without power

Solution 22. The correct answer is **(f)**: High-powered money. The equation for high-powered money is $H = CU + R$.

Problem 23. What is the formula for the money multiplier, where cu is the currency/deposit ratio and re is the reserve/deposit ratio?

- (a) $mm = 1/re$
- (b) $mm = 1/cu$
- (c) $mm = (cu + re)/(cu + 1)$
- (d) $mm = (cu + 1)/(cu + re)$
- (e) $mm = (cu + 1)(cu + re)$
- (f) $mm = cu + re$
- (g) $mm = cure$

Solution 23. The correct answer is **(d)**: $mm = (cu + 1)/(cu + re)$

Problem 24. The amount of currency in Assumptionland is 430,000. The amount of bank deposits in Assumptionland is 4,310,000. The amount of bank reserves in Assumptionland is 3,400,000. What is the money multiplier in Assumptionland?

Solution 24. The formula for the money multiplier is $mm = (cu + 1)/(cu + re)$, where $cu = CU/D$, and $re = R/D$. Here, $CU = 430000$, $D = 4310000$, and $R = 3400000$. Thus,

$$cu = CU/D = 430000/4310000 = cu = 0.0997679814 \text{ and } re = R/D = 3400000/4310000 = re = 0.788863109$$

$$\text{So } mm = (cu + 1)/(cu + re) = (0.0997679814 + 1)/(0.0997679814 + 0.788863109) = \mathbf{mm = 1.237597911}$$

Problem 25. Which of these factors directly affect "re" - the reserve/deposit ratio in the formula for the money multiplier? More than one answer may be possible.

- (a) The printing of additional paper money bills by the government.
- (b) The reserve requirement.
- (c) Banking regulations such as federal deposit insurance.
- (d) Transactions demand among consumers.
- (e) The banks' tradeoff between profitability and safety.
- (f) The annualized rate of GDP growth.

Solution 25. The following factors directly affect re:

- (b):** The reserve requirement.
- (c):** Banking regulations such as federal deposit insurance.
- (e):** The banks' tradeoff between profitability and safety.

Choice (d) is not a correct answer but is worth mention: transactions demand among consumers directly affects cu but not re.

Section 6

Business Cycles

Problem 26. What is the output gap?

- (a) The difference between output at the peak of an expansionary boom and output at the bottom of a recession's trough.
- (b) The difference between output produced and output consumed.
- (c) The difference between output consumed at the upper 50% of income levels and the output consumed at the lower 50% of income levels.
- (d) The difference between the trend or potential output and actual output.
- (e) The difference between the current year's output and output in the past year.
- (f) A fashionable clothing retail store that has added "output" to its name and began to write its name using all lowercase letters.

Solution 26. The correct answer is **(d)**: The difference between the trend or potential output and actual output.

Problem 27. Which of these variables tend to have large fluctuations during business cycles? More than one answer is possible.

- (a) Interest rates
- (b) Employment
- (c) Wages
- (d) Inflation
- (e) Output
- (f) Consumption
- (g) Investment

Solution 27. Output, employment, and investment tend to have large fluctuations during business cycles. The other variables listed tend to have small fluctuations. So **(b), (e), and (g)** are correct answers.

Problem 28. In the Frisch-Slutsky Paradigm, what are the three components of any business cycle?

- (a) Impulse, Propagation, Business Cycle
- (b) Expansion, Contraction, Recovery
- (c) Boom, Bust, Bailout
- (d) Peak, Trough, Peak
- (e) Consumption, Investment, Government Spending

Solution 28. The correct answer is **(a)**: Impulse, Propagation, Business Cycle

Problem 29. According to the Keynesian view, what initially causes business cycles? More than one answer is possible.

- (a) A drop in aggregate demand or a lack of consumer demand for goods in existence.
- (b) Price and wage stickiness.
- (c) Artificially lowered interest rates by the Federal Reserve, leading to an unsustainable credit expansion.
- (d) An over-tightening of monetary policy at a time when easier credit is needed.
- (e) Coordination failures among firms on the free market.
- (f) Business cycles do not exist. At each point in time, individuals act optimally and try to maximize economic value.

Solution 29. The correct answers are

(a): A drop in aggregate demand or a lack of consumer demand for goods in existence.

(b): Price and wage stickiness

(e): Coordination failures among firms on the free market.

Keynesians think that any of these phenomena may cause a business cycle.

Problem 30. According to the Real Business Cycle Theory, what is the source of changes in output in the economy?

- (a) Increases in the money supply
- (b) Overproduction and underconsumption
- (c) Technology shocks
- (d) Fluctuations in economic actors' preferences
- (e) Government investment in infrastructure and economic development
- (f) Changes in consumer spending

Solution 30. The correct answer is **(c):** technology shocks. According to the Real Business Cycle Theory, some kind of positive or negative technology shock is virtually always the cause of output changes.

Section 7

The Aggregate Supply / Aggregate Demand Model

Problem 31. Which of these explain the downward slope of the Aggregate Demand (AD) curve? More than one answer is possible.

- (a) International Forces: Domestic goods become relatively cheaper with respect to foreign goods when domestic prices decline.
- (b) Debtors become richer than they were expecting to as a result of the drop in prices.
- (c) As prices increase, creditors become richer.
- (d) The Multiplier Effect: Government spending increases total output in the economy by more than the amount of the spending.
- (e) The Wealth Effect: Consumers' purchasing power increases as prices decline.
- (f) The Inflation Tax: As prices increase, the cost of holding onto cash increases.
- (g) There is a negative relationship between prices and output. As prices decline, output increases.

Solution 31. The three factors which explain the downward slope of the Aggregate Demand (AD) curve are

- (a):** International Forces: Domestic goods become relatively cheaper with respect to foreign goods when domestic prices decline.
- (e):** The Wealth Effect: Consumers' purchasing power increases as prices decline.
- (g):** There is a negative relationship between prices and output. As prices decline, output increases.

Problem 32. Which of these macroeconomic models allows one to conclude that expansionary monetary policy can be inflationary?

- (a) The Random Walk model
- (b) The Simple Keynesian model
- (c) The IS-LM model
- (d) The Aggregate Supply-Aggregate Demand (AS-AD) model
- (e) The Theory of Just Price
- (f) The Black-Scholes model

Solution 32. Of these, only the AS-AD model allows one to explicitly view price as a variable directly affected by expansionary monetary policy. An increase in government spending G affects Y (output), i (interest rates), and P (price level). In the IS-LM and Simple Keynesian model, P is fixed, so inflation is not accounted for. The Random Walk model has nothing to say about causality, and the Theory of Just Price is simply normative. The Black-Scholes model deals with pricing options, not macroeconomic policies. Thus, **(d) is the correct answer.**

Problem 33. Which of these statements about the Aggregate Supply (AS) curve are true? More than one answer is possible.

- (a) A horizontal AS curve assumes complete wage and price stickiness.
- (b) The pure Keynesian case holds that AS is horizontal.
- (c) The pure Keynesian case holds that AS is vertical.
- (d) The pure Classical case holds that AS is vertical.
- (e) The pure Classical case holds that AS is horizontal.
- (f) AS can shift out as a result of changes in technology and improvements in the institutional environment.
- (g) A horizontal AS curve is consistent with the view that an expansionary monetary policy is purely inflationary.
- (h) The AS curve can slope diagonally upward to account for a combination of intermediate-run factors that render output somewhat responsive changes in aggregate demand, but not entirely so.

Solution 33. The correct answers are

- (a):** A horizontal AS curve assumes complete wage and price stickiness.
- (b):** The pure Keynesian case holds that AS is horizontal.
- (d):** The pure Classical case holds that AS is vertical.
- (f):** AS can shift out as a result of changes in technology and improvements in the institutional environment.
- (h):** The AS curve can slope diagonally upward to account for a combination of intermediate-run factors that render output somewhat responsive to changes in aggregate demand, but not entirely so.

Problem 34. Which of these are characteristics of the Random Walk model? More than one answer is possible.

- (a) There is significant wage and price stickiness.
- (b) Surprises are virtually always small and do not account for substantial deviations from prior data.
- (c) Information is very quickly incorporated into prices and economic actors' decisions.
- (d) There is a steady, predictable long-run growth trend in output.
- (e) It is impossible to say with any degree of confidence what the output, prices, and inflation next time period will be.
- (f) All unemployment is voluntary.

Solution 34. The only correct answer is

- (c):** Information is very quickly incorporated into prices and economic actors' decisions.

The Random Walk model rejects assumptions (a) and (d), has little or nothing to say about (f), and recognizes that, while large surprises are possible ((b) is false), it is also the case that present returns are highly correlated with past returns ((e) is false), so some confidence in the future may be warranted.

Problem 35. What is true about the short run in the AS-AD model? More than one answer is possible.

- (a) The short-run AS curve is vertical.
- (b) Aggregate demand shifts largely affect output in the short run.
- (c) The concept of scarcity is crucially important in the short run.
- (d) It is possible for government expansionary monetary policy to boost output in the short run.
- (e) Technological progress is so rapid that it is the dominant cause of changes in output.

Solution 35. The correct answers are

- (b):** Aggregate demand shifts largely affect output in the short run.
- (d):** It is possible for government expansionary monetary policy to boost output in the short run.

Section 8

The Federal Reserve

Problem 36. Which of these are *tools* used by the Federal Reserve? That is, over which of these factors does the Fed have direct control?

- (a) Federal funds rate (ffr)
- (b) Reserve requirements
- (c) Money supply
- (d) Bank reserves
- (e) Full employment
- (f) Economic growth
- (g) Discount Rate
- (h) Open Market Operations (OMO)
- (i) Balance of payments
- (j) Price stability
- (k) Interest rate
- (l) Exchange rate
- (m) 90-day T-Bill rate

Solution 36. The three tools of the Fed are

- (b):** Reserve requirements
- (g):** Discount Rate
- (h):** Open Market Operations (OMO)

Problem 37. Which of these are *instruments* used by the Federal Reserve? That is, what do the tools of the Fed above most directly affect?

- (a) Federal funds rate (ffr)
- (b) Reserve requirements
- (c) Money supply
- (d) Bank reserves
- (e) Full employment
- (f) Economic growth
- (g) Discount Rate
- (h) Open Market Operations (OMO)
- (i) Balance of payments
- (j) Price stability
- (k) Interest rate
- (l) Exchange rate
- (m) 90-day T-Bill rate

Solution 37. The instruments of the Fed are

- (a): Federal funds rate (ffr)
- (d): Bank reserves

Problem 38. Which of these are *targets* used by the Federal Reserve? That is, which of these does the Fed try to affect in an effort to reach its goals?

- (a) Federal funds rate (ffr)
- (b) Reserve requirements
- (c) Money supply
- (d) Bank reserves
- (e) Full employment
- (f) Economic growth
- (g) Discount Rate
- (h) Open Market Operations (OMO)
- (i) Balance of payments
- (j) Price stability
- (k) Interest rate
- (l) Exchange rate
- (m) 90-day T-Bill rate

Solution 38. The targets of the Fed are

- (c): Money supply
- (k): Interest rate
- (l): Exchange rate

Problem 39. Which of these are possible *goals* of a central bank? That is, which of these do central banks sometimes strive to ultimately accomplish?

- (a) Federal funds rate (ffr)
- (b) Reserve requirements
- (c) Money supply
- (d) Bank reserves
- (e) Full employment
- (f) Economic growth
- (g) Discount Rate
- (h) Open Market Operations (OMO)
- (i) Balance of payments
- (j) Price stability
- (k) Interest rate
- (l) Exchange rate
- (m) 90-day T-Bill rate

Solution 39. The goals of a central bank can be

- (e): Full employment
- (f): Economic growth
- (i): Balance of payments
- (j): Price stability

Problem 40. Which of these are functions of the Federal Reserve? More than one answer is possible.

- (a) Source of monetary stabilization policy.
- (b) Provider of Federal Deposit Insurance.
- (c) Regulator of banks.
- (d) Regulator of the government.
- (e) Bank for banks.
- (f) Bank for the government.
- (g) Regulator of wages and prices.
- (h) Debt financing of the federal budget deficit.
- (i) Source of fiscal policy.
- (j) Watchdog agency monitoring Congress and executive departments.
- (k) Benefactor of the poorest and least privileged members of society.

Solution 40. The functions of the Fed include the following:

- (a): Source of monetary stabilization policy
- (c): Regulator of banks
- (e): Bank for banks
- (f): Bank for the government
- (h): Debt financing of the federal budget deficit (a part of function (a)).

Section 9

The Economics of Contemporary Banking

Problem 41. What is the discount rate?

- (a) The amount of funds that a depository institution must hold in reserve against deposit liabilities.
- (b) The rate other banks in the Federal Reserve system charge each other for overnight loans.
- (c) The rate at which the Fed charges banks for overnight loans.
- (d) The rate which the Fed charges the government for loans.
- (e) The target interest rate which the Fed seeks to bring about.
- (f) The currency-deposit ratio that the Fed mandates for the economy.

Solution 41. The discount rate is

- (c): The rate at which the Fed charges banks for overnight loans.

Problem 42. Which of these statements about the federal funds rate (ffr) are true? More than one answer is possible.

- (a) The ffr rate other banks in the Federal Reserve system charge each other for overnight loans.
- (b) The ffr is the rate at which the Fed charges banks for overnight loans.
- (c) The ffr is the rate which the Fed charges the government for loans.
- (d) The ffr is most often greater than the discount rate.
- (e) The ffr is most often less than the discount rate.
- (f) The ffr is the same as the discount rate.

Solution 42. The following statements about the federal funds rate (ffr) are true:

- (a): The ffr rate other banks in the Federal Reserve system charge each other for overnight loans.
- (e): The ffr is most often less than the discount rate. It is desirable for banks to first try to lend to each other before resorting to the Fed.

Problem 43. In which of these situations would high-powered money be created? More than one answer is possible.

- (a) The Fed purchases gold and pays by adding liabilities to its balance sheets.
- (b) There are no excess bank reserves, and the Fed increases the reserve requirement on banks.
- (c) The amount of currency in the economy declines sharply.
- (d) The Fed purchases government securities and pays by adding liabilities to its balance sheets.
- (e) The Fed purchases foreign currency and pays by adding liabilities to its balance sheets.
- (f) The Fed sells government securities, collects the monetary proceeds, and keeps the money in its vaults.

Solution 43. High-powered money is defined as $H = CU + R$. Increasing CU or R will, ceteris paribus, create high-powered money. Situations where this occurs include

- (a): The Fed purchases gold and pays by adding liabilities to its balance sheets.
- (b): There are no excess bank reserves, and the Fed increases the reserve requirement on banks.
- (d): The Fed purchases government securities and pays by adding liabilities to its balance sheets.
- (e): The Fed purchases foreign currency and pays by adding liabilities to its balance sheets.

Problem 44. Which of these statements about bank runs are true? More than one answer is possible.

- (a) The Fed today tries to prevent bank runs by attempting to reduce the amount high-powered money.
- (b) Bank runs are impossible on a bank that holds 100% reserves.
- (c) Bank runs stopped altogether with the advent of federal deposit insurance (FDIC).
- (d) Bank runs tend to be isolated and have no effect on overall confidence in the economy.
- (e) The Fed today tries to bail out certain large banks thought to be "too big to fail."
- (f) Federal deposit insurance (FDIC) was the first attempt to protect depositors against the consequences of bank runs.

Solution 44. The following statements are true:

- (b): Bank runs are impossible on a bank that holds 100% reserves.
- (e): The Fed today tries to bail out certain large banks thought to be "too big to fail."

Problem 45. Which of these statements about moral hazard are true? More than one answer is possible.

- (a) The reckless behavior of some teenagers can be considered a case of moral hazard.
- (b) The risk-taking of an entrepreneur who has invested his life savings in a project can be considered a case of moral hazard.
- (c) The Fed bailing out banks deemed "too big to fail" creates a moral hazard.
- (d) Moral hazard is a type of principal-agent problem.
- (e) Moral hazard facilitates irresponsible behavior.
- (f) When economic functions, roles, and duties are determined on a private property basis rather than a socialized basis, moral hazard is more prevalent.
- (g) Moral hazard entails the consequences of an agent's behavior being partially shared by his principal.
- (h) Moral hazard occurs when an individual fully suffers the consequences of his actions; thereby, the alleged "morality" of full individual responsibility is hazardous to individual actors having to bear the brunt of it.

Solution 45. The following statements about moral hazard are true:

- (a): The reckless behavior of some teenagers can be considered a case of moral hazard.
- (c): The Fed bailing out banks deemed "too big to fail" creates a moral hazard.
- (d): Moral hazard is a type of principal-agent problem.
- (e): Moral hazard facilitates irresponsible behavior.
- (g): Moral hazard entails the consequences of an agent's behavior being partially shared by his principal.

Section 10

Monetary Policy and Related Concepts

Problem 46. Which of these statements about the credit channel are true? More than one correct answer is possible.

- (a) The credit channel results from higher values of collateral being available for loans.
- (b) The credit channel has an equal impact on large and small banks.
- (c) The credit channel occurs when an increase in the interest rate reduces the number of loans that banks provide.
- (d) The credit channel is a channel by which banks extend credit to one another.
- (e) The credit channel is a type of credit rationing resulting from monetary policy.

Solution 46. The following statements about the credit channel are true:

- (c): The credit channel occurs when an increase in the interest rate reduces the number of loans that banks provide.
- (e): The credit channel is a type of credit rationing resulting from monetary policy.

Problem 47. Which of these statements regarding the rule-based and discretion-based approaches to monetary policy are true? More than one correct answer is possible.

- (a) Imperfect information and policy lags render a discretion-based approach less effective than would have been the case otherwise.
- (b) A discretion-based policy is designed to be as predictable as possible.
- (c) A rule-based monetary policy offers greater predictability to agents in the economy.
- (d) A rule-based monetary policy is more flexible than a discretion-based monetary policy.
- (e) A discretion-based policy is particularly suited to developing countries, where the central banks have shown that they cannot be trusted with following simple rules.

Solution 47. The following statements are true:

- (a): Imperfect information and policy lags render a discretion-based approach less effective than would have been the case otherwise.
- (c): A rule-based monetary policy offers greater predictability to agents in the economy.

Problem 48. Which of these statements about monetary policy targets are true? More than one correct answer is possible.

- (a) The Federal Reserve Bank of the United States has a dual mandate and works to influence both prices and employment levels.
- (b) It is possible to target the money supply and interest rates simultaneously.
- (c) Targeting the money supply always results in less output variability than targeting interest rates.

- (d) When the LM curve is the source of fluctuations, then the Fed should target the money supply in order to reduce output variability.
- (e) When the LM curve is the source of fluctuations, then the Fed should target interest rates in order to reduce output variability.
- (f) When the IS curve is the source of fluctuations, then the Fed should target interest rates in order to reduce output variability.

Solution 48: The following statements about monetary policy targets are true:

- (a):** The Federal Reserve Bank of the United States has a dual mandate and works to influence both prices and employment levels.
- (e):** When the LM curve is the source of fluctuations, then the Fed should target interest rates in order to reduce output variability.

Problem 49: Which of these factors can shift the Aggregate Demand (AD) curve? More than one correct answer is possible.

- (a) Large changes in relative prices.
- (b) Change in net exports.
- (c) Decrease in consumption C.
- (d) Increase in government spending G.
- (e) New government regulations.
- (f) Changes in the tax rate.
- (g) Changes in labor supply.
- (h) Anything that shifts the IS curve.
- (i) Discoveries of new natural resources.
- (j) New technologies.
- (k) Substantial changes in weather.
- (l) Anything that shifts the LM curve.

Solution 49: The following factors can shift the Aggregate Demand (AD) curve:

- (b):** Change in net exports.
- (c):** Decrease in consumption C.
- (d):** Increase in government spending G.
- (f):** Changes in the tax rate.
- (h):** Anything that shifts the IS curve.
- (m):** Anything that shifts the LM curve.

Problem 50: Which of these factors can shift the Aggregate Supply (AS) curve? More than one correct answer is possible.

- (a) Large changes in relative prices.
- (b) Change in net exports.
- (c) Decrease in consumption C.
- (d) Increase in government spending G.
- (e) New government regulations.

- (f) Changes in the tax rate.
- (g) Changes in labor supply.
- (h) Anything that shifts the IS curve.
- (i) Discoveries of new natural resources.
- (j) New technologies.
- (k) Substantial changes in weather.
- (l) Anything that shifts the LM curve.

Solution 50: The following factors can shift the Aggregate Supply (AS) curve:

- (a):** Large changes in relative prices.
- (e):** New government regulations.
- (f):** Changes in the tax rate.
- (g):** Changes in labor supply.
- (i):** Discoveries of new natural resources.
- (j):** New technologies.
- (k):** Substantial changes in weather.

Section 11

Stabilization Policy and the Phillips Curve

Problem 51: Which of these policy lags contribute to the reduced effectiveness of fiscal and monetary policy? More than one correct answer is possible.

- (a) Division lags: The government needs to divide the economy into different sectors and interest groups and give each of them a custom-tailored solution to their problems. This takes time and resources.
- (b) Supervision lags: There is not enough timely oversight of all branches that implement fiscal and monetary policy, and so there are insufficient guarantees that agreed-upon policy measures will actually be carried out.
- (c) Decision lags: Governmental decisions take time to make - especially with regard to fiscal policy.
- (d) Inflation lags: It takes time for an increase in the money supply to be reflected in prices.
- (e) Information lags: It takes time for past economic data to be compiled and verified.
- (f) Litigation lags: Any government agency wishing to implement fiscal or monetary policy changes is likely to get sued by the affected parties. This leads to prolonged legal battles before the policy gets implemented.
- (g) Implementation lags: Even after a policy decision has been made, it takes time for it to be actualized and for its effects to be manifest.

Solution 51: The following are the three policy lags that explain why fiscal and monetary policy are "long and variable":

- (e): Information lags: It takes time for past economic data to be compiled and verified.
- (c): Decision lags: Governmental decisions take time to make - especially with regard to fiscal policy.
- (g): Implementation lags: Even after a policy decision has been made, it takes time for it to be actualized and for its effects to be manifest.

Problem 52. Which of these phenomena may reduce the effectiveness of fiscal and monetary policy? More than one correct answer is possible.

- (a) If a tax cut is thought to be temporary, people will tend to save it rather than spending it, seeing it as transitory rather than permanent income.
- (b) Government spending and investment tend to raise interest rates and thus crowd out private investment, thus exacerbating any already existing economic problems.
- (c) If monetary policy is perceived to be unreliable and non-credible, individuals will tend to ignore central bank promises to reduce inflation or stabilize the economy.
- (d) The principle of Ricardian equivalence states that, when governments engage in deficit spending, households will tend to save enough money to pay for anticipated future tax increases. Thus, instead of spending money, individuals will tend to save more of it.

(e) Economic stabilization is not the same as growth. By trying to reduce the variations in output, fiscal and monetary policymakers might also slow down the overall economic growth rate and thus render virtually everyone worse off in the long run.

Solution 52. All of the above are valid possibilities for phenomena that reduce the effectiveness of fiscal and monetary policy.

Problem 53. Which of these statements about time inconsistency are true?

- (a) Time inconsistency is minimized when individual actors are in some manner bound to follow through with a decision before they actually face making that decision.
- (b) Time inconsistency is minimized when individual actors have the maximum possible discretion to choose the best response to situations as they arise.
- (c) According to time inconsistency, whatever policy is optimal in one period is optimal in all periods.
- (d) According to time inconsistency, a policy that is optimal in the first period may no longer be optimal in the next period.
- (e) An alcoholic man drives by a liquor store on his way from work every day. If he decides to simply use his force of will to restrain his desire to enter the liquor store every time he drives by it, then he has solved his time inconsistency problem.
- (f) An alcoholic man drives by a liquor store on his way from work every day. If he decides to pick a different route home from work - along which there are no liquor stores - then he has solved his time inconsistency problem.

Solution 53. The following statements about time inconsistency are true:

- (a):** Time inconsistency is minimized when individual actors are in some manner bound to follow through with a decision before they actually face making that decision.
- (d):** According to time inconsistency, a policy that is optimal in the first period may no longer be optimal in the next period.
- (f):** An alcoholic man drives by a liquor store on his way from work every day. If he decides to pick a different route home from work - along which there are no liquor stores - then he has solved his time inconsistency problem.

Problem 54. Which of these is true according to the Phillips Curve model?

- (a) There exists a direct correlation between inflation and unemployment.
- (b) There exists an inverse correlation between inflation and unemployment.
- (c) There exists a direct correlation between inflation and trade deficits.
- (d) There exists an inverse correlation between inflation and trade deficits.
- (e) There exists a direct correlation between output and unemployment.
- (f) There exists an inverse correlation between output and unemployment.

Solution 54: The Phillips Curve model states that

- (b):** There exists an inverse correlation between inflation and unemployment.

Problem 55. What is the equation for the Phillips Curve? Here, U = actual rate of unemployment, U^* = natural rate of unemployment, gw = wage growth, and ε = speed of wage adjustment to the employment gap.

- (a) $gw = \varepsilon U U^*$
- (b) $gw = \varepsilon(U - U^*)$
- (c) $gw = -\varepsilon(U - U^*)$
- (d) $gw = \varepsilon(U + U^*)$
- (e) $gw = -\varepsilon(U + U^*)$
- (f) $gw = \varepsilon/(U - U^*)$

Solution 55. The equation for the Phillips Curve is

(c): $gw = -\varepsilon(U - U^*)$

Problem 56. What is the equation for the Expectations Augmented Phillips Curve? Here, U = actual rate of unemployment, U^* = natural rate of unemployment, π = actual inflation, π_e = expected inflation, and ε = speed of wage adjustment to the employment gap.

- (a) $\pi = \pi_e + \varepsilon(U + U^*)$
- (b) $\pi = \pi_e - \varepsilon(U + U^*)$
- (c) $\pi = \pi_e - \varepsilon(U^* - U)$
- (d) $\pi = \pi_e - \varepsilon(U - U^*)$
- (e) $\pi_e = \pi - \varepsilon(U - U^*)$
- (f) $\pi_e = \pi - \varepsilon(U^* - U)$

Solution 56. The equation for the Expectations Augmented Phillips Curve is

(d): $\pi = \pi_e - \varepsilon(U - U^*)$

Problem 57. In Inflationville, expected annual inflation is 53%. The actual rate of unemployment is 1%, and the natural rate of unemployment is 10%. The speed of wage adjustment to the employment gap is 0.42. Use the equation for the Expectations Augmented Phillips Curve to find the actual annual inflation in Inflationville.

Solution 57. We use the equation $\pi = \pi_e - \varepsilon(U - U^*)$, where $\pi_e = 0.53$, $\varepsilon = 0.42$, $U = 0.01$, $U^* = 0.1$. So $\pi = 0.53 - 0.42(0.01 - 0.1) = \pi = \mathbf{0.5678} = \mathbf{56.78\%}$

Problem 58. Which of these statements about NAIRU are true? More than one correct answer is possible.

- (a) NAIRU stands for National Average Intertemporal Rate of Unemployment.
- (b) NAIRU stands for Non-Accelerating Inflation Rate of Unemployment.
- (c) NAIRU stands for Naturally Anti-Inflationary Rate of Unemployment.
- (d) Milton Friedman coined the term NAIRU.
- (e) A. C. Phillips coined the term NAIRU.

- (f) A. C. Pigou coined the term NAIRU.
- (g) Robert Lucas coined the term NAIRU.
- (h) NAIRU is the natural rate of unemployment, analyzed within the framework of the Phillips Curve.
- (i) NAIRU is the actual rate of unemployment, analyzed within the framework of the Phillips Curve.
- (j) NAIRU is the difference between the natural and actual rates of unemployment, analyzed within the framework of the Phillips Curve.
- (k) Using expansionary monetary policy, it is possible to achieve a sustainable rate of unemployment below NAIRU.
- (l) Using expansionary monetary policy, it is possible to only temporarily achieve a rate of unemployment below NAIRU, while only producing inflation in the long run.

Solution 58. The following statements about NAIRU are true:

- (b):** NAIRU stands for Non-Accelerating Inflation Rate of Unemployment.
- (d):** Milton Friedman coined the term NAIRU.
- (h):** NAIRU is the natural rate of unemployment, analyzed within the framework of the Phillips Curve.
- (l):** Using expansionary monetary policy, it is possible to only temporarily achieve a rate of unemployment below NAIRU, while only producing inflation in the long run.

Problem 59. Which of these ideas did Milton Friedman contribute to economists' views of the Phillips Curve? More than one correct answer is possible.

- (a) People suffer from persistent money illusion and can be duped into expecting inflation rates that deviate from actual inflation. Thus, Phillips curves will never shift out in response to changes in the money supply.
- (b) In the long run, policies that assume the existence of a stable tradeoff between inflation and unemployment have no effect on unemployment while systematically increasing inflation.
- (c) The long-run Phillips curve is concave up and decreasing.
- (d) The long-run Phillips curve is concave up and increasing.
- (e) The long-run Phillips curve is vertical.
- (f) The long-run Phillips curve is horizontal.
- (g) The long-run Phillips curve is concave down and decreasing.

Solution 59. Milton Friedman contributed the following ideas:

- (b):** In the long run, policies that assume the existence of a stable tradeoff between inflation and unemployment have no effect on unemployment while systematically increasing inflation.
- (e):** The long-run Phillips curve is vertical.

Problem 60. Which of these statements about the *liquidity trap* are true?

- (a) The liquidity trap occurs when the LM curve is horizontal.
- (b) The liquidity trap occurs when the LM curve is vertical.

- (c) In a liquidity trap, people are highly sensitive to changes in interest rates.
- (d) In a liquidity trap, people are not at all sensitive to changes in interest rates.
- (e) Effective monetary policy to get out of a liquidity trap includes the systematic slashing of interest rates and the lowering of reserve requirements.
- (f) In a liquidity trap, monetary policy is completely ineffective.
- (g) In a liquidity trap, fiscal policy is completely ineffective.

Solution 60. The following statements about the liquidity trap are true:

- (a):** The liquidity trap occurs when the LM curve is horizontal.
- (d):** In a liquidity trap, people are not at all sensitive to changes in interest rates.
- (f):** In a liquidity trap, monetary policy is completely ineffective.

Section 12

Assorted Questions and Solutions on Economic Growth

Problem 61. Which of these statements is true of Thomas Robert Malthus's views on population growth? More than one of these answers may be possible.

- (a) Malthus thought that war was a preventative check on population growth.
- (b) Malthus thought that we should embrace the positive checks on population growth - such as diseases and famines - instead of attempting to eliminate them.
- (c) Malthus fully anticipated modern technological growth and predicted catastrophic population growth despite improvements in technological productivity.
- (d) Malthus believed that food production grew arithmetically, while population grew geometrically, in the absence of positive and/or preventative checks on population growth.
- (e) Malthus encouraged population growth so that more geniuses might come about and invent life-enhancing technologies.
- (f) Malthus thought that the foremost effect of increases in productivity would be that people would have more children.

Solution 61. The correct statements about Malthus's views are as follows:

(d): Malthus believed that food production grew arithmetically, while population grew geometrically, in the absence of positive and/or preventative checks on population growth.

(f): Malthus thought that the foremost effect of increases in productivity would be that people would have more children.

Problem 62. The developing country of Gricbaxlia has a current per capita GDP of \$3400. Due to newly instituted free-market reforms, the annual continuously compounded per capita GDP growth rate in Gricbaxlia is expected to be 5% for the foreseeable future. How long will it take before the Gricbaxlian per capital GDP is \$78000?

Solution 62. We use the formula $Y = Xe^{rt}$, where r is the annual growth rate, X is the initial GDP, Y is the desired level of GDP, and t is the time it takes for GDP to grow from X to Y . Here, t is our unknown, $X = 3400$, $Y = 78000$, $r = 0.05$.

We rearrange the formula $Y = Xe^{rt}$ thus:

$$Y/X = e^{rt}; rt = \ln(Y/X); t = \ln(Y/X)/r = \ln(78000/3400)/0.05 = t = \mathbf{62.6586679 \text{ years}}$$

Problem 63. Which of these are ways in which the per capita GDP growth of a country can be permanently increased? More than one answer is possible

- (a) Increase in the rate at which government prints money.
- (b) Government subsidies to companies deemed to be acting in the "public interest."
- (c) Improvements in technology, productivity, and the capital stock.
- (d) A stimulus to aggregate demand due to an increase in spending by the government or the private sector.
- (e) A decrease in the natural rate of unemployment due to the repeal of employment regulations.
- (f) An increase in the labor force participation rate due to the repeal of policies that lead to large numbers of discouraged workers.

Solution 63. The following are ways in which per capita GDP growth can be permanently increased:

- (c): Improvements in technology, productivity, and the capital stock.
- (e): A decrease in the natural rate of unemployment due to the repeal of employment regulations.
- (f): An increase in the labor force participation rate due to the repeal of policies that lead to large numbers of discouraged workers.

Problem 64. Total output in the country of Cobbland can be modeled by the following equation: $Y = 750L^{0.6}K^{0.4}$. At time $T = 0$, total labor in Cobbland was equal to 15, and total capital was equal to 50. By time $T = 1$, total labor has increased to 30, and total capital has increased to 60. What was the rate of output growth in Cobbland during that year?

Solution 64. Cobbland's output follows a Cobb-Douglas function, $Y = AL^{1-\alpha}K^\alpha$.

We need to find the output at $T = 1$, divide it by the output at $T = 0$ and subtract 1 to get the rate of growth.

$$\text{At } T = 0, \text{ output was } Y = 750L^{0.6}K^{0.4} = 750 \cdot 15^{0.6} \cdot 50^{0.4} = 18209.75156$$

$$\text{At } T = 1, \text{ output was } Y = 750L^{0.6}K^{0.4} = 750 \cdot 30^{0.6} \cdot 60^{0.4} = 29688.92799$$

$$\text{Rate of output growth was } 29688.92799/18209.75156 - 1 = \mathbf{0.6303862189}$$

Problem 65. In a Cobb-Douglas function $Y = AL^{1-\alpha}K^\alpha$, what is the name for the term A ?

- (a) Total product of capital
- (b) Marginal product of capital
- (c) Marginal product of labor
- (d) Total factor productivity
- (e) Marginal factor productivity
- (f) Total product of labor
- (g) Capital stock

Solution 65. A in a Cobb-Douglas function is called **(d):** Total factor productivity.

Section 13

Capital, Investment, and Economic Growth

Problem 66. Which of these is a possible way of formulating the cost of capital?

- (a) Cost of capital = depreciation + replenishment costs
- (b) Cost of capital = depreciation + opportunity costs
- (c) Cost of capital = market rate of interest + risk premium
- (d) Cost of capital = depreciation + risk premium
- (e) Cost of capital = market rate of interest + opportunity costs

Solution 66. A possible way of formulating the cost of capital is

(b): Cost of capital = depreciation + opportunity costs

Problem 67. What is a possible way of formulating the opportunity costs of capital?

- (a) Opportunity costs = maintenance costs + replenishment costs
- (b) Opportunity costs = market rate of interest
- (c) Opportunity costs = market rate of interest + risk premium
- (d) Opportunity costs = depreciation + risk premium
- (e) Opportunity costs = market rate of interest + depreciation

Solution 67. A possible way of formulating the opportunity costs of capital is

(c): Opportunity costs = market rate of interest + risk premium

Problem 68. Which of these statements about capital and interest rates are correct?

- (a) In a market without institutional barriers and information asymmetries, the costs of internal finance to a company should be the same as the costs of external finance.
- (b) Labor is the factor which most accurately explains differences in output among the countries of the world.
- (c) Lower interest rates correspond with high levels of investment in capital.
- (d) Higher interest rates correspond with lower levels of savings.
- (e) In the long run and at the aggregated level, savings S can be expected to be equal to investment I .

Solution 68. The following statements are correct:

- (a):** In a market without institutional barriers and information asymmetries, the costs of internal finance to a company should be the same as the costs of external finance.
- (c):** Lower interest rates correspond with high levels of investment in capital.
- (e):** In the long run and at the aggregated level, savings S can be expected to be equal to investment I .

Problem 69. Which of these statements about investment and economic growth are correct?

- (a) Net investment can be expressed as follows:
Net investment = Gross investment + Depreciation
- (b) Net investment can be expressed as follows:
Net investment = Gross investment - Depreciation
- (c) Increases in investment are ultimately financed through increases in savings.
- (d) For richer countries, increases in total factor productivity are the primary driving force of economic growth, whereas for poorer countries, increases in the capital stock are more important.
- (e) If depreciation exceeds gross investment, a country's capital stock will grow.
- (f) The term "absolute convergence" describes standards of living among countries becoming increasingly similar until no difference exists.
- (g) Absolute convergence requires poorer countries to grow faster than richer countries.

Solution 69. The following statements are correct:

- (b):** Net investment can be expressed as follows:
Net investment = Gross investment - Depreciation
- (c):** Increases in investment are ultimately financed through increases in savings.
- (d):** For richer countries, increases in total factor productivity are the primary driving force of economic growth, whereas for poorer countries, increases in the capital stock are more important.
- (f):** The term "absolute convergence" describes standards of living among countries becoming increasingly similar until no difference exists.
- (g):** Absolute convergence requires poorer countries to grow faster than richer countries.

Problem 70. Which of these are reasons or conditions explaining why the Solow growth model predicts absolute convergence for countries?

- (a) Absolute convergence in the Solow model holds because of the assumption that all countries will have the same rates of savings, access to technology, and population growth rates.
- (b) According to the Solow model, there are increasing returns to scale from technological innovations and capital stock increases.
- (c) According to the Solow model, countries will converge on their balanced growth paths.
- (d) According to the Solow model, the rate of return on capital is lower in countries with more capital per worker.
- (e) According to the Solow model, population growth in richer countries will eventually slow economic growth to a crawl, giving the poorer countries an opportunity to catch up without increasing their capital stock or access to technology.
- (f) As poor countries gain access to new methods of technology, differences in technology and knowledge between rich countries and poor countries will shrink.
- (g) The Solow growth model holds that institutions in all countries will eventually mirror those of the West, leading to a better institutional climate for growth.

Solution 70. The following are reasons or conditions explaining why the Solow growth model predicts absolute convergence for countries:

(a): Absolute convergence in the Solow model holds because of the assumption that all countries will have the same rates of savings, access to technology, and population growth rates.

(c): According to the Solow model, countries will converge on their balanced growth paths.

(d): According to the Solow model, the rate of return on capital is lower in countries with more capital per worker.

(f): As poor countries gain access to new methods of technology, differences in technology and knowledge between rich countries and poor countries will shrink.

Section 14

Exogenous and Endogenous Economic Growth Models

Problem 71. Which of these statements regarding the Solow economic growth model are true? More than one answer may be correct.

- (a) Capital accumulation can influence the growth rate in the steady state of the Solow model.
- (b) The way to increase growth at the steady state of the Solow model is to increase total factor productivity.
- (c) At the stable steady state for an economy, gross investment is equal to depreciation.
- (d) At the steady state, if savings increases, consumption will simply decrease so as to not affect the growth rate of output.
- (e) In the Solow model, population growth acts to decrease the amount of capital per worker and shift up the depreciation line.
- (f) Changes in the savings rate will shift the total production $Y = f(K, L)$.
- (g) Changes in the savings rate will influence the linear function $(n + d)K$.
- (h) Changes in the savings rate will shift the function sY .
- (i) Higher savings and investment rates will result in a larger capital stock at the steady state.

Solution 71. The following statements regarding the Solow economic growth model are true:

- (b):** The way to increase growth at the steady state of the Solow model is to increase total factor productivity.
- (c):** At the stable steady state for an economy, gross investment is equal to depreciation.
- (d):** At the steady state, if savings increases, consumption will simply decrease so as to not affect the growth rate of output.
- (e):** In the Solow model, population growth acts to decrease the amount of capital per worker and shift up the depreciation line.
- (h):** Changes in the savings rate will shift the function sY .
- (i):** Higher savings and investment rates will result in a larger capital stock at the steady state.

Problem 72. Which of these statements is true about the *Golden Rule* in the Solow economic growth model?

- (a) Under the Golden Rule, consumption is maximized in the steady state of the economy.
- (b) Under the Golden Rule, investment is maximized in the steady state of the economy.
- (c) The Golden Rule states that it is desirable to maximize the distance between the output function Y and the break-even investment function $(n+d)K$.
- (d) The Golden Rule states that it is desirable to maximize the distance between the output function Y and the savings function sY .
- (e) The Golden Rule states that it is desirable to maximize the distance between the savings

function sY and the break-even investment function $(n+d)k$.

- (f) Under the Golden Rule, marginal product of capital MPK is equal to the savings rate S .
- (g) Under the Golden Rule, marginal product of capital MPK is equal to $(n + d)$.
- (h) The Golden Rule conditions are Pareto-optimal.

Solution 72. The following statements about the Golden Rule are correct:

- (a): Under the Golden Rule, consumption is maximized in the steady state of the economy.
- (c): The Golden Rule states that it is desirable to maximize the distance between the output function Y and the break-even investment function $(n+d)K$.
- (g): Under the Golden Rule, marginal product of capital MPK is equal to $(n + d)$.
- (h): The Golden Rule conditions are Pareto-optimal.

Problem 73. Which of these are shortcomings of the Solow exogenous growth model? More than one answer may be possible.

- (a) The Solow model exaggerates large differences in standards of living.
- (b) The Solow model ignores the crucial role of government-printed paper money in stimulating long-term economic growth.
- (c) Savings in the Solow model is assumed to be constant.
- (d) The Solow model has no welfare considerations or means to assess welfare.
- (e) The Solow model does not have any role for institutions - including property rights, legal arrangements, political mechanisms, and other factors.
- (f) The Solow model assumes increasing returns to scale, which is simply unrealistic.
- (g) In the Solow model, the savings elasticity with respect to output is too small and too delayed.
- (h) The implied marginal return to capital in the Solow model is too small.
- (i) By focusing our attention on economic growth, the Solow model ignores the truly important question, which is how to achieve equal distribution of wealth.
- (j) The Solow economic growth model does not mention God. Therefore, it cannot possibly contain a shred of truth.

Solution 73. The following are shortcomings of the Solow model:

- (c): Savings in the Solow model is assumed to be constant.
- (d): The Solow model has no welfare considerations or means to assess welfare.
- (e): The Solow model does not have any role for institutions - including property rights, legal arrangements, political mechanisms, and other factors.
- (g): In the Solow model, the savings elasticity with respect to output is too small and too delayed.

Problem 74. Which of these statements are true regarding the Solow model and human capital? More than one correct answer is possible.

- (a) If human capital is incorporated into the production function in the Solow model, then total factor productivity in the Solow model needs to be adjusted to exclude human capital.
- (b) With human capital factor added into the production function, the Solow model explains about 66 percent of income per capita variations across countries.

- (c) With human capital factor added into the production function, the Solow model explains about 80 percent of income per capita variations across countries.
- (d) Without human capital factor added into the production function, the Solow model explains about 66 percent of income per capita variations across countries.
- (e) Without human capital factor added into the production function, the Solow model explains about 80 percent of income per capita variations across countries.

Solution 74. The following statements are correct:

- (a):** If human capital is incorporated into the production function in the Solow model, then total factor productivity in the Solow model needs to be adjusted to exclude human capital.
- (c):** With human capital factor added into the production function, the Solow model explains about 80 percent of income per capita variations across countries.
- (d):** Without human capital factor added into the production function, the Solow model explains about 66 percent of income per capita variations across countries.

Problem 75. Which of these are true statements about endogenous growth models?

- (a) Unlike exogenous growth models, endogenous growth models actually provide an explanation for where total factor productivity comes from.
- (b) Only one steady state is possible with endogenous growth models.
- (c) Multiple steady states are possible with endogenous growth models.
- (d) Endogenous growth models incorporate increasing returns to scale over certain ranges.
- (e) As in exogenous growth models, savings in endogenous growth models has only a level effect and no real growth effect.
- (f) Endogenous growth models, like the Solow model, predict absolute convergence for standards of living among countries.
- (g) Endogenous growth models imply that countries with different savings and investment rates will have large differences in economic growth rates.
- (h) According to endogenous growth models, savings has no effect on technology.

Solution 75. The following statements are correct:

- (a):** Unlike exogenous growth models, endogenous growth models actually provide an explanation for where total factor productivity comes from.
- (c):** Multiple steady states are possible with endogenous growth models.
- (d):** Endogenous growth models incorporate increasing returns to scale over certain ranges.
- (g):** Endogenous growth models imply that countries with different savings and investment rates will have large differences in economic growth rates.

Problem 76. Which of these economists did pioneering work on endogenous growth models?

- (a) John Maynard Keynes
- (b) Thomas Malthus
- (c) Paul Romer
- (d) John Kenneth Galbraith

- (e) David Ricardo
- (f) Hans-Hermann Hoppe

Solution 76. The correct answer is **(c)**: Paul Romer.

Problem 77. Which of these statements regarding growth traps and poverty traps in endogenous growth models are correct?

- (a) Absolute convergence is still possible in the presence of growth and poverty traps.
- (b) Poverty traps and growth traps exist because there are increasing returns to scale over certain ranges of capital investment.
- (c) A poverty trap entails a high capital-labor ratio.
- (d) A growth trap entails a high capital-labor ratio.
- (e) Countries in poverty traps are not guaranteed to ever obtain high rates of economic growth.
- (f) Countries in poverty traps can escape those traps by increasing their savings rates.
- (g) Countries in poverty traps can escape those traps by increasing their consumption rates.
- (h) Countries in growth traps can grow indefinitely without limit.

Solution 77. The following statements are correct:

- (b):** Poverty traps and growth traps exist because there are increasing returns to scale over certain ranges of capital investment.
- (d):** A growth trap entails a high capital-labor ratio.
- (e):** Countries in poverty traps are not guaranteed to ever obtain high rates of economic growth.
- (f):** Countries in poverty traps can escape those traps by increasing their savings rates.
- (h):** Countries in growth traps can grow indefinitely without limit.

Problem 78. Which of these statements about *conditional convergence* is true?

- (a) Conditional convergence states that economies with the same savings rates, population growth rates, and access to technology will reach the same steady-state equilibrium.
- (b) Conditional convergence states that economies with the same population growth rates and access to technology but different savings rates will have the same economic growth rates but at different steady-state equilibria.
- (c) Conditional convergence is an extremely fast process, and we can expect it to happen over a time span of a few years.
- (d) Conditional convergence is generally supported by empirical observation.
- (e) The Solow exogenous growth model limits its predictions to conditional convergence for all countries.

Solution 78. The following statements are correct:

- (b):** Conditional convergence states that economies with the same population growth rates and access to technology but different savings rates will have the same economic growth rates but at different steady-state equilibria.
- (d):** Conditional convergence is generally supported by empirical observation.

About Mr. Stolyarov

Gennady Stolyarov II (G. Stolyarov II) is an actuary, science-fiction novelist, independent philosophical essayist, poet, amateur mathematician, composer, and Editor-in-Chief of [The Rational Argumentator](#), a magazine championing the principles of reason, rights, and progress.

In December 2013, Mr. Stolyarov published *Death is Wrong*, an ambitious children's book on life extension illustrated by his wife Wendy. *Death is Wrong* can be found on Amazon in [paperback](#) and [Kindle](#) formats.

Mr. Stolyarov has contributed articles to the [Institute for Ethics and Emerging Technologies \(IEET\)](#), [The Wave Chronicle](#), [Le Quebecois Libre](#), [Brighter Brains Institute](#), [Immortal Life](#), [Enter Stage Right](#), [Rebirth of Reason](#), [The Liberal Institute](#), and the [Ludwig von Mises Institute](#). Mr. Stolyarov also published his articles on Associated Content (subsequently the Yahoo! Contributor Network) from 2007 until its closure in 2014, in an effort to assist the spread of rational ideas. He held the highest Clout Level (10) possible on the Yahoo! Contributor Network and was one of its Page View Millionaires, with over 3.1 million views.

Mr. Stolyarov holds the professional insurance designations of Associate of the Society of Actuaries (ASA), Associate of the Casualty Actuarial Society (ACAS), Member of the American Academy of Actuaries (MAAA), Chartered Property Casualty Underwriter (CPCU), Associate in Reinsurance (ARe), Associate in Regulation and Compliance (ARC), Associate in Personal Insurance (API), Associate in Insurance Services (AIS), Accredited Insurance Examiner (AIE), and Associate in Insurance Accounting and Finance (AIAF).

Mr. Stolyarov has written a science fiction novel, *Eden against the Colossus*, a philosophical treatise, *A Rational Cosmology*, a play, *Implied Consent*, and a free self-help treatise, *The Best Self-Help is Free*. You can watch his [YouTube Videos](#). Mr. Stolyarov can be contacted at gennadystolyarovii@gmail.com.