Instructions:

Use your own paper for the review questions. For the final exam, show all work on the exam. This is an algebra class – do not guess! Write and solve equations to earn full credit.

An approved graphing calculator is required. If you solve a problem using only your calculator, you must give a brief explanation, including essential keystrokes, of what you did on your calculator or you will not receive credit.

Completely simplify algebraic answers. Completely reduce numerical answers.
Give exact answers (no rounding) unless instructed otherwise, or unless units require rounding to make sense.
Include units where appropriate.

Plot and label at least 4 points for all non-linear graphs; plot and label two or more points for linear graphs.

Problems may continue on the next column or page.

Evaluate:

1) $-\sqrt{\frac{1}{25}}+\frac{9}{5}\left(-\frac{1}{3}\right)$

2) $4(-3)-(-2)-\frac{1}{10}+\frac{2}{5}$

3) $\left(-\frac{2}{3}\right)^3 \div\left(-\frac{10}{9}\right)$

4) $\frac{\sqrt[3]{-125}}{15+30\div 6\cdot 2}$

5) $\left|2^4-5^2\right|-\left|11-16\right|$

6) $10-\left[(4-5)^2+(12-14)\right]^4$

7) Nine less than five times a number is 26. What is the number?

8) Using either the intersection or x-intercept method, solve each equation graphically using your graphing calculator. For each equation answer the following: What function(s) did you graph in your calculator? Briefly describe the location of the solution on your graph. Round the solutions to four decimal places. (Hint: Do not even TRY to solve these by hand!)
   (a) $2^x=-x^3+5$
   (b) $\sqrt[4]{x}-\pi=-x^4+3$
   (c) $-0.02x^5+6=2+\sqrt{x}$
   (d) $\sqrt[3]{x}-4=-x^3+2$
   (e) $\ln(x)+4=e^{x-3}$ (Hint: 2 solutions)
   (f) $0.02\left(3^x\right)=-0.1x^4+6$ (Hint: 2 solutions)
   (g) $\pi x^5-3=\sqrt[5]{x}+6$
   (h) $\log(x+4)=-x^3+2$
   (i) $0.1x^4=6\sqrt[3]{x}$ (Hint: 2 solutions)

9) Find three consecutive numbers such that the sum of the first integer, half the second integer, and four times the third integer is –30.

10) How much money will be in your account if you invest $3000 at an annual interest rate of 4% for 10 years compounded:
   (a) quarterly
   (b) daily
   (c) continuously

11) A computer was recently purchased for $1450.75, including tax. If the tax rate is 7.5%, find the price of the computer before taxes.

12) The smallest angle in a triangle has a measure which is one-half the measure of the largest angle. The measure of the medium sized angle is 20° less than the measure of the largest angle. Find the measures of the three angles in the triangle.

13) The perimeter of a rectangle is 76 meters. The length is 16 meters less than twice the width. Find the dimensions of the rectangle.

14) A candy shop manager mixes M&M's worth $2.00 per pound with trail mix worth $1.50 per pound to make 50 pounds of party mix worth $1.80 per pound. How many pounds of each she should use?

15) A tree stands straight when it is supported by a 10-foot rope which is tied to the tree and staked to the ground x feet

away from the base of the tree. If the rope is tied to the tree trunk 2x feet above the ground, how far is the stake from the tree? Hint: Pythagorean Theorem.

16) Find how many quarts of 4% butterfat milk and 1% butterfat milk should be mixed to yield 60 quarts of 2% butterfat milk.

17) Two shirts and three pairs of shorts cost $95.75. Three shirts and one pair of shorts cost $73.80. Find the price of each.

18) An airplane takes 3 hours to travel a distance of 2160 miles with the wind. The return trip takes 4 hours against the wind. Find the speed of the airplane in still air and the speed of the wind.

19) A company determines that its costs for manufacturing x cell phones can be modeled by the cost function: $C(x) = 12x + 15000$ (in dollars). The company's revenues for selling x cell phones can be modeled by the revenue function: $R(x) = 32x$. Find the number of cell phones that must be sold in order for the company to break even. What is the company's profits at the point when sales are 700 cell phones?

20) Suppose that a computer store just announced a sale. The sale is for an 8% discount in the price for a particular computer model. If the discounted price is $2162, find the original price of the computer.

21) Two trains start at the same point going in the same direction on parallel tracks. The faster train travels at 70 mph and the slower train travels at 42 mph. In how many hours will the distance between them be 154 miles?

22) Three numbers have a sum of 31. The middle number is 1 more than the smallest number. The sum of the two smaller numbers is 7 more than the largest number. Find the three numbers.

23) In a certain triangle, the sum of the measures of the smallest and largest angles is 50º more than the measure of the medium angle. The medium angle measures 25 º more than the smallest angle. Find the three angles.

24) Lee has some $5, $10, and $20-bills. He has a total of 51 bills, worth a total of $795. The number of $5-bills is 25 less than the number of $20-bills. Find the number of each type of bill.

25) Peg walks 10 miles in the same time it takes May to walk 6 miles. If Peg walks 1 mile per hour less than twice May's rate, what is the rate at which Peg walks?

26) An experience roofer can roof a house in 26 hours. A beginner roofer needs 39 hours to complete the same job. Find how long it takes for the two to complete the job working together.

27) Two cars start at the same point and travel in opposite directions. One car travels at 60 mph and the other at 65 mph. How far has each traveled when they are 375 miles apart?

28) Alan can clean the apartment in 6 hours. When his friend Steve helps, together they can clean the apartment in 4 hours. Find how long it takes Steve to clean the apartment alone.

29) Write an equation and solve the problem.
   (a) If you pay $300 for a 64-GB device, this is 20% more than the price of a 32-GB device. What is the price of the 32-GB device?
   (b) If you pay $120 for a TI-84CE, this is 20% less than the price of a TI-89. What is the price of the TI-89?

30) Write equation(s) and solve the problem.
   (a) A pharmacist needs 70 liters of a 50% alcohol solution. She has available 30% and 80% solutions. How many liters of each solutions should she mix to obtain 70 liters of a 50% alcohol solution?
   (b) A pharmacist needs 500 ml of a 20% phenobarbital solution but has only 5% and 25% phenobarbital solutions available. Find how many milliliters of each she should mix to get the desired solution.

31) Write an equation and solve the problem.
   (a) You walk 1.5 mph faster than your friend. You walk 7 miles in the same

time that your friend walks 4 miles. Find both speeds.

(b) You drive 6 hours on a level highway and then 2 hours more in the mountains. Your speed in the mountains is 20 mph slower. You drive a total of 300 miles. What is your rate in the mountains?

(c) You drive 6 hours on a level highway and then 2 hours more in the mountains. Your speed in the mountains is 20 mph slower. You drive 300 miles more on the level than in the mountains. What is your speed in the mountains?

32) The sum of a positive number and twice its square is 105. Find the number.

33) A pebble is hurled upward from the top of a skyscraper which is 880 feet tall, with an initial velocity of 96 feet per second. The height of the pebble in feet, h(t), after t seconds is given by the polynomial function: $h(t) = -16t^2 + 96t + 880$. How long does it take for the pebble to hit the ground?

34) Help Mr. Elmer Fudd and his ACME company break even! Elmer finds that his company's revenues from the sale of their Wiley Coyote traps is given by the function: $R(x) = 3x^2 + 2x$ (in thousands of dollars, where x is the number of traps sold). He also finds that the costs of producing these traps is given by the function: $C(x) = 2x^2 - 3x + 50$ (also in thousands of dollars). How many traps does Elmer's ACME company need to sell in order to break even? Then, calculate the revenue being made at that break-even point.

35) Divide.

(a) $\dfrac{2x^4 - 7x^3 + x + 2}{x - 5}$

(b) $\dfrac{4xy^5 + 8x^2 - 2}{4xy}$

36) Suppose y varies directly as x. Suppose that y is 11 when x is $\frac{1}{3}$. Find x when $y = \frac{1}{3}$.

37) Suppose w varies inversely as q. Suppose that $w = 0.2$ when $q = \frac{7}{10}$. Find w when $q = 0.5$.

38) Suppose B is proportional to the square of C and inversely proportional to D. If B = 27 when C = 6 and D = 16, find B when C = 3 and D = 36.

39) Write an equation and solve the problem.

(a) y varies directly as the cube of x. $y = 10$ when $x = 2$. Find y when $x = 3$.

(b) y varies inversely as the cube root of x. $y = 10$ when $x = 8$. Find y when $x = 27$.

(c) y varies jointly as the square of x and inversely as the square root of z. $y = 10$ when $x = 2$ and $z = 9$. Find y when $x = 3$ and $z = 25$.

40) The hypotenuse of a right triangle is 9cm long, and one leg is 7 cm longer than the other leg. What is the length of both of the legs of the triangle? Hint: Pythagorean Theorem.

41) The area of a right triangle is 14 square meters. One leg is 3.5 meters longer than the other. What are the lengths of the legs? Round to the nearest hundredth of a meter, if necessary.

42) The width of a rectangular carpet is 9 feet less than its length. If the area of the carpet is 112 square feet, find the width.

43) George and Cindy together can stock the shelves of the local market in 5 hours. When she works alone, it takes Cindy one hour longer to stock than it takes George working alone. How long does it take for George to stock the shelves when he works alone? Round to the nearest tenth of an hour, if necessary.

44) Two cars left an intersection at the same time, one heading north, the other heading west. Later they were exactly 95

miles apart. The car heading west had gone 38 miles less than twice as far as the car headed north. How far had each car traveled? Hint: Pythagorean Theorem.

45) Determine whether the equation (or function) is linear or not. Graph it. Write the domain and range using interval notation. Find the x-intercept(s) and y-intercept(s) and write them as ordered pairs.

(a) $y = -3x + 2$

(b) $y = 3 - x^2$

(c) $y = |x - 1|$

(d) $h(x) = \sqrt{4 - x}$

(e) $g(x) = \sqrt{x + 2} - 3$

(f) $h(x) = \sqrt{3 - x} + 2$

(g) $f(x) = -2(x - 3)^2 + 4$

(h) $x = 6y^2 - 5y - 4$

46) Find the inverse of: $f(x) = \dfrac{x}{x + 2}$

47) For the following functions, determine if the function is one-to-one by graphing it and performing the horizontal line test. If the function is one-to-one, find its inverse, and then graph its inverse on the same graph. If it is not invertible, say so.

(a) $f(x) = x^3 - 1$

(b) $f(x) = -\dfrac{1}{4}$

(c) $f(x) = -2x - 1$

(d) $f(x) = |x + 1|$

(e) $f(x) = \sqrt[3]{1 - 2x}$

(f) $f(x) = 1 - x^2$

(g) $f(x) = \left(\dfrac{2}{3}\right)^x$

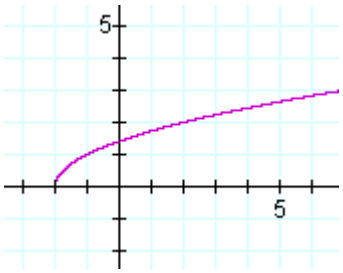
(h) $f(x) = \log_2 x$

48) Solve.

(a) $3^x = \dfrac{1}{243}$

(b) $2^{7-x} = 32^x$

49) Draw the graph of the inverse of the function having the given graph.



50) Evaluate these logarithms. If undefined, say so.

(a) $\log_2 8 =$

(b) $\log_3 3 =$

(c) $\log_{1/2} 1 =$

(d) $\log_3(-1) =$

(e) $\log_4\left(\dfrac{1}{4}\right) =$

(f) $\log_8 0 =$

(g) $\log_7 7^2 =$

(h) $\ln\sqrt{e} =$

51) Solve. If there are no solutions, so state.

(a) $\log_x\left(\dfrac{1}{64}\right) = -3$

(b) $\log_3 x = -1$

(c) $\log_5 x = 0$

(d) $\log_5(-2) = x$

(e) $\log_6 0 = x$

(f) $\log_2 64 = x$

(g) $\log 10^{-3} = x$

(h) $\log\left(\dfrac{1}{10^{1/4}}\right) = x$

(i) $\ln e^{-3} = x$

(j) $\ln\left(\dfrac{1}{e^{1/4}}\right) = x$

52) For $f(x) = \sqrt{x}$ *and* $g(x) = \dfrac{x^2 + 16}{x - 2}$, find the following:

(a) $(f \circ g)(x)$

(b) $(g \circ f)(x)$

(c) $(f \circ g)(3)$

(d) $(g \circ f)(4)$

53) Use properties of logs to evaluate $6^{\log_6 x}$

54) Use properties of logs to rewrite the expression as a single logarithm:
(a) $\log_5 13 + \log_5 2$
(b) $3\log_7 x + \log_7 y - \log_7 (x+3)$
(c) $\frac{1}{2}\ln x - 4\ln w + \ln z$

55) Write the expression given as the sum or difference of multiples of logarithms:
(a) $\log_3 \frac{(x+1)^2}{7z}$
(b) $\ln\sqrt{3ab}$

56) If $\log_b 3 = 0.8$ *and* $\log_b 6 = 1.3$, find the value of $\log_b 2$.

57) Approximate $\log_8 13$ to four decimal places using your graphing calculator.

58) Solve.
(a) $\log_7 3 + \log_7 x = 4$
(b) $\log(x+1) - \log(x-1) = \log 15$
(c) $\ln(x+2) + \ln(x-2) = \ln 5$
(d) $\log_4 (x-3) + \log_4 x = 1$
(e) $\log_2(x^2 + x) - \log_2(x+1) = 0$
(f) $\log_2(x^2 + 2) + \log_2(x+1) = 0$
(g) $\log_2(3x - 1) = 1$

59) Solve: $2^{3x-5} = 17$.
(a) Find the exact solution.
(b) Approximate the solution to four decimal places.

60) Solve: $e^{3x-7} = 6$.
(a) Find the exact solution.
(b) Approximate the solution to four decimal places.

61) Find the vertex of the parabola $x = y^2 - 6y + 1$ and indicate whether it opens upward, downward, to the left, or to the right.

62) Identify whether each equation, when graphed, will be a parabola, circle, ellipse, or hyperbola.
(a) $x^2 + 4y^2 = 16$
(b) $9y^2 - 4x^2 = 36$

63) Graph each equation.
(a) $\frac{(x-1)^2}{4} + \frac{(y+2)^2}{9} = 1$
(b) $x^2 + y^2 - 4x + 6y = 3$
(c) $4x^2 + (y+2)^2 = 4$
(d) $y^2 - 4x^2 = 16$

64) Solve. Write solution as an ordered pair.
(a) $\begin{cases} y = 3x - 5 \\ x^2 + y^2 = 5 \end{cases}$
(b) $\begin{cases} x^2 - 3y^2 = -1 \\ 2x^2 - 7y^2 = -5 \end{cases}$
(c) $\begin{cases} y = x^2 - 1 \\ y = -4x - 5 \end{cases}$

65) Find the first three terms of the sequence with the general term: $a_n = \frac{n^2}{n+1}$

66) Find the general term for the sequence: 5, 11, 21, 35, 53,… …

67) Use summation (also called sigma) notation to write the sum:
(a) $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6}$
(b) 2 + 7 + 12 + 17 + 22

68) Evaluate the sum: $\sum_{i=2}^{6} \frac{1}{i+2}$

69) Evaluate the piecewise function
$$f(x) = \begin{cases} 5x + 4 & x \le 1 \\ \frac{1}{3}x - 1 & x > 1 \end{cases}$$
(a) $f(0)$
(b) $f(1)$
(c) $f(2)$

70) Evaluate the piecewise function

$$f(x)=\begin{cases}-4 & x<-2\\ 1-x^2 & x\geq -2\end{cases}$$

(a) $f(-3)$
(b) $f(-2)$
(c) $f(0)$

71) Graph the piecewise function

$$f(x)=\begin{cases}3x-1 & x\leq -1\\ -x & x>-1\end{cases}$$

72) Graph the piecewise function

$$f(x)=\begin{cases}2x^2 & x\leq 2\\ 2 & x\geq 2\end{cases}$$

73) Find the inverse of the one-to-one function.

(a) $f(x)=64x^3-1$
(b) $g(x)=\sqrt[3]{64x-1}$
(c) $h(x)=(64x-1)^3$
(d) $k(x)=64\sqrt[3]{x}-1$
(e) $m(x)=64\sqrt[3]{x-1}$

74) Graph each inequality.

(a) $y^2-4y-x+7<0$
(b) $(x+1)^2+(y-2)^2\leq 9$

75) Graph the solution for the following systems.

(a) $\begin{cases}9x^2+25y^2<225\\ x^2+4y^2\geq 16\end{cases}$

$\begin{cases}x^2\leq 1-y\\ x^2\leq y+1\end{cases}$

ANSWERS

1) $-\frac{4}{5}$

2) $-\frac{97}{10}$

3) $\frac{4}{15}$

4) $-\frac{1}{5}$

5) 4

6) 9

7) 7

8) For all parts, there are two methods.
Method 1: Intersection of graphs: The solution is the x-coordinate of the point of intersection, found by (TI-83, 83+,84+): 2nd TRACE (CALC), option 5 (intersection), 1st curve (enter), 2nd curve (enter), guess (enter).. Repeat, if necessary, for a second solution.
Method 2: X-intercept : The solution is the x-coordinate of the x-intercept, found by (TI-83, 83+,84+): 2nd TRACE (CALC), option 2 (zero); left bound (enter), right bound, (enter), guess, (enter). Repeat, if necessary, for a second solution.

(a) Method 1: Intersection of graphs
$y_1 = 2^x$
$y_2 = -x^3 + 5$
Method 2: X-intercept
$y_1 = 2^x + x^3 - 5$
By either method, the solution is
$x \approx 1.3487$

(b) Method 1: Intersection of graphs
$y_1 = \sqrt[4]{x} - \pi$ (Close the parentheses or radical before subtracting pi.)
$y_2 = -x^4 + 3$
Method 2: X-intercept
$y_1 = \sqrt[4]{x} - \pi + x^4 - 3$
By either method, the solution is
$x \approx 1.4980$

(c) Method 1: Intersection of graphs
$y_1 = -0.02x^5 + 6$
$y_2 = 2 + \sqrt{x}$
Method 2: X-intercept
$y_1 = -0.02x^5 + 6 - 2 - \sqrt{x}$ (or simplified)
By either method, the solution is
$x \approx 2.6023$

(d) Method 1: Intersection of graphs
$y_1 = \sqrt[3]{x} - 4$ (Close the parentheses or radical before subtracting 4.)
$y_2 = -x^3 + 2$
Method 2: X-intercept
$y_1 = \sqrt[3]{x} - 4 + x^3 - 2$ (or simplified)
By either method, the solution is
$x \approx 1.6880$

(e) Method 1: Intersection of graphs
$y_1 = \ln x + 4$ (Close the parentheses before adding 4.)
$y_2 = e^{x-3}$
Method 2: X-intercept
$y_1 = \ln x + 4 - e^{x-3}$
By either method, the solutions are $x \approx 0.0193$ and $x \approx 4.7139$

(f) Method 1: Intersection of graphs
$y_1 = 0.02(3^x)$
$y_2 = -0.1x^4 + 6$
Method 2: X-intercept
$y_1 = 0.02(3^x) + 0.1x^4 - 6$
By either method, the solutions are $x \approx -2.7830$ and $x \approx 2.7351$

(g) Method 1: Intersection of graphs
$y_1 = \pi x^5 - 3$
$y_2 = \sqrt[5]{x} + 6$ (Close the parentheses or radical before adding 6.)
Method 2: X-intercept

$y_1 = \pi x^5 - 3 - \sqrt[5]{x} - 6$ (or simplified)
By either method, the solution is $x \approx 1.2618$

(h) Method 1: Intersection of graphs
$y_1 = \log(x+4)$
$y_2 = -x^3 + 2$
Method 2: X-intercept
$y_1 = \log(x+4) + x^3 - 2$
By either method, the solution is $x \approx 1.0895$

(i) Method 1: Intersection of graphs
$y_1 = 0.1x^4$
$y_2 = 6\sqrt[3]{x}$
Method 2: X-intercept
$y_1 = 0.1x^4 - 6\sqrt[3]{x}$
By either method, the solutions are $x = 0$ and $x \approx 3.0546$

9) -7, -6, and -5.

10)
(a) \$4466.59 Use compound interest formula: $A = P\left(1 = \frac{r}{n}\right)^{nt}$, n=4
(b) \$4475.38 Use compound interest formula, n=365
(c) \$4475.47 Use continuously compounded interest formula: $A = Pe^{rt}$

11) \$1349.53
12) largest angle $80°$, smallest angle $40°$, middle-sized angle $60°$
13) 20 meters by 18 meters
14) 20 pounds of trail mix and 30 pounds of M&Ms
15) $2\sqrt{5}$ feet (It didn't say to round!)
16) 20 quarts of 4% and 40 quarts of 1%
17) \$17.95 per shirt and \$19.95 per pair of shorts
18) plane 630 mph and wind 90 mph
19) 750 cell phones to break even. Profits = Revenue – Costs. So profits $= -\$1000$ when 700 cell phones are made and sold.
20) Original price \$2350
21) 5.5 hours (or 5 hours, 30 minutes)
22) smallest number 9, middle-sized number 10, largest number 12.
23) Smallest angle $40°$, middle-sized angle $65°$, largest angle $75°$
24) seven \$5 bills, twelve \$10 bills, and thirty-two \$20 bills.
25) Peg's speed is 5 mph. (May's speed was 3 mph, but that wasn't the question.)
26) 15.6 hours (or 15 hours, 36 minutes)
27) 180 miles traveled by car going 60 mph and 195 miles traveled by car going 65 mph.
28) Steve takes 12 hours if working alone.
29)
(a) \$250
(b) \$150
30)
(a) 42 L of 30% and 28 L of 80%
(b) 125 ml of 5% and 375 ml of 25%
31)
(a) I walk 3.5 mph, my friend 2 mph
(b) 22.5 mph
(c) 45 mph

32) $x = 7$. (Reject extraneous)
33) 11 seconds
34) 5 traps to break even, \$85,000 revenue
35)
(a) $2x^3 + 3x^2 + 15x + 76 + \frac{382}{x-5}$
(b) $y^4 + \frac{2x}{y} - \frac{1}{2xy}$

36) $x = \frac{1}{99}$

37) $w = \frac{7}{25} = 0.28$

38) B=3
39)
(a) $x = \frac{135}{4}$
(b) $x = \frac{20}{3}$
(c) $x = \frac{27}{2}$

40) shorter leg is $\frac{-7+\sqrt{113}}{2}$ centimeters (Did not say to round.) Longer leg is $\frac{7+\sqrt{113}}{2}$ centimeters

41) shorter leg is approximately 3.82 meters, longer leg is approximately 7.32 meters.

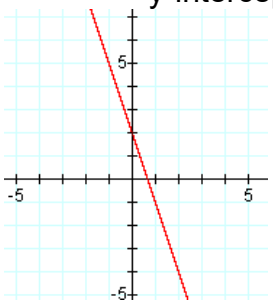
42) 7 feet

43) 9.5 hours or 9 hours and 30 minutes

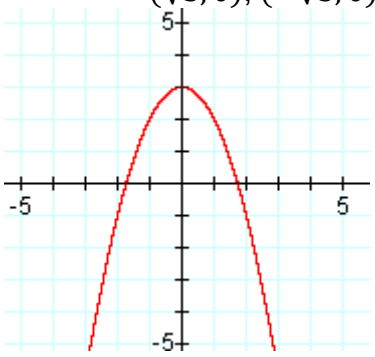
44) northbound car went 57 mph, westbound car went 76 miles.

45)

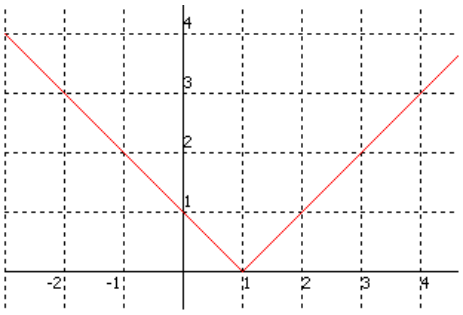
(a) linear. Domain: $(-\infty,\infty)$, Range: $(-\infty,\infty)$, x-intercept $(\frac{2}{3},0)$, y-intercept (0,2)



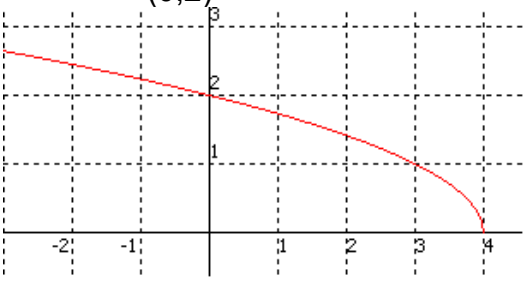
(b) not linear. Domain: $(-\infty,\infty)$, Range: $(-\infty,3]$, x-intercepts $(\sqrt{3},0)$, $(-\sqrt{3},0)$, y-intercept (0,3)



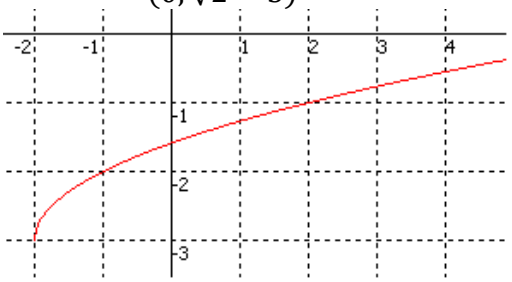
(c) not linear. Domain: $(-\infty,\infty)$, Range: $[0,\infty)$, x-intercept (1,0), y-intercept (0,1)



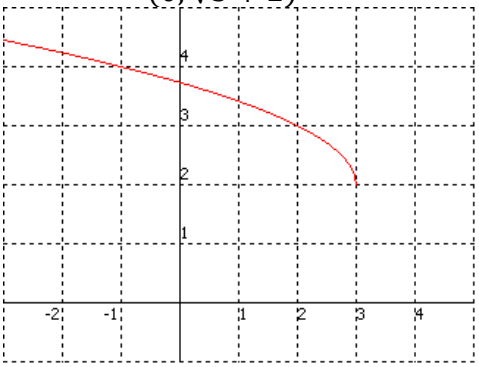
(d) not linear. Domain: $(-\infty,4]$, Range: $[0,\infty)$, x-intercept (4,0), y-intercept (0,2)



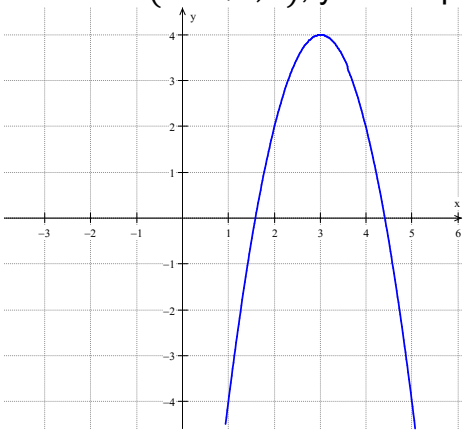
(e) not linear. Domain: $[-2,\infty)$, Range: $[-3,\infty)$, x-intercept (7,0), y-intercept $(0,\sqrt{2}-3)$



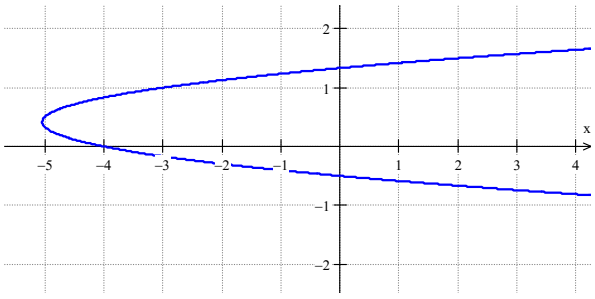
(f) not linear. Domain: $(-\infty,3]$, Range: $[2,\infty)$, no x-intercept, y-intercept $(0,\sqrt{3}+2)$



(g) not linear, Domain $(-\infty, \infty)$, Range $(-\infty, 4]$, x-intercepts $(3+\sqrt{2}, 0)$, $(3-\sqrt{2}, 0)$, y-intercept (0,-14)



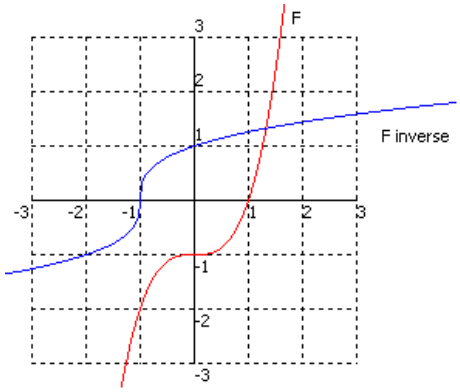
(h) not linear, Domain $[-\frac{121}{24}, \infty)$, Range $(-\infty, \infty)$, x-intercept (0,-4), y-intercepts $\left(0, -\frac{1}{2}\right)\left(0, \frac{4}{3}\right)$

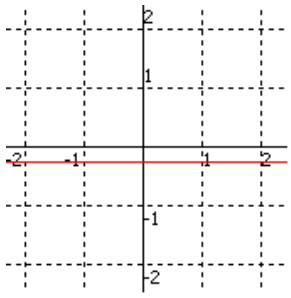


46) $f^{-1}(x) = \dfrac{-2x}{x-1}$ or $f^{-1}(x) = \dfrac{2x}{1-x}$

47) A relation is one-to-one if its graph passes the horizontal line test.

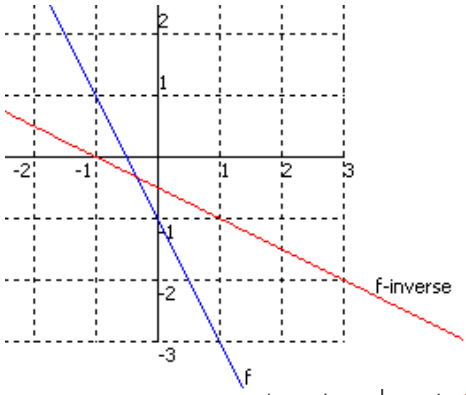
(a) one-to-one, $f^{-1}(x) = \sqrt[3]{x+1}$

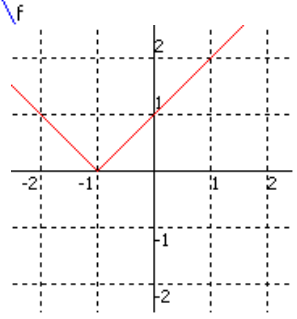




(b) not one-to-one

(c) one-to-one, $f^{-1}(x) = -\dfrac{1}{2}x - \dfrac{1}{2}$,

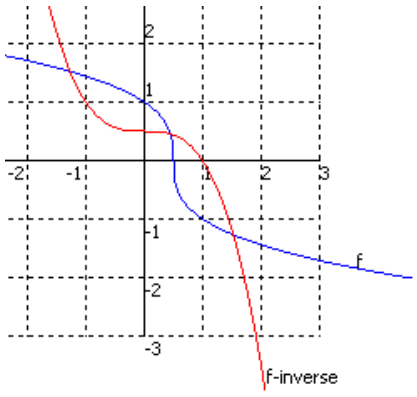




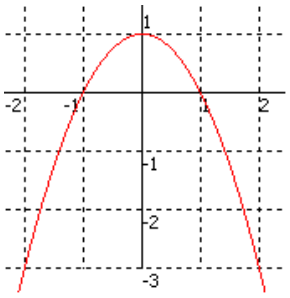
(d) not one-to-one;

(e) one-to-one;

$$f^{-1}(x) = \frac{1-x^3}{2} = -\frac{1}{2}x^3 + \frac{1}{2}$$

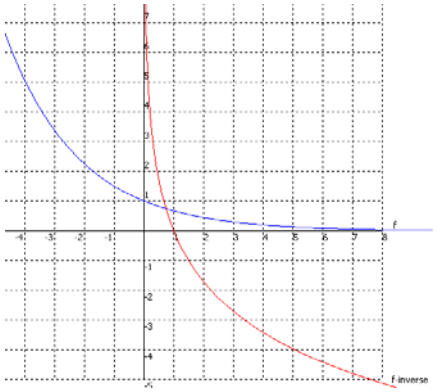


(f) not one-to-one;

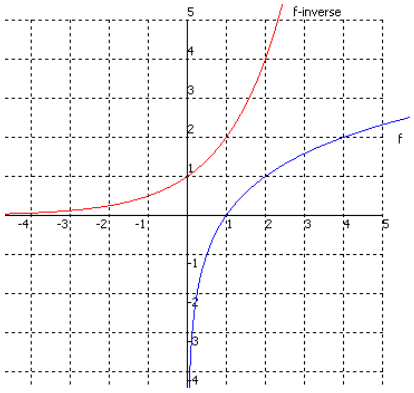


(g) one-to-one;

$$f^{-1}(x) = \log_{2/3}(x) = \frac{\log(x)}{\log\left(\frac{2}{3}\right)}$$



(h) one-to-one; $f^{-1}(x) = 2^x$

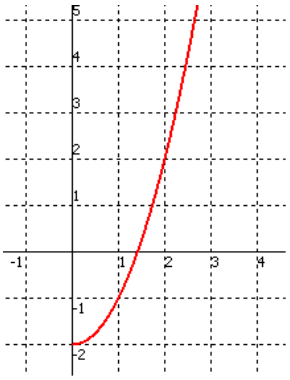


48)

(a) $x = -5$

(b) $x = \frac{7}{6}$

49)



50)

(a) 3
(b) 1
(c) 0
(d) undefined
(e) -1
(f) undefined
(g) 2
(h) 0.5

51)

(a) $x = 4$

(b) $x = \frac{1}{3}$

(c) $x = 1$

(d) undefined expression, x has no solution.

(e) undefined expression, x has no solution.

(f) $x = 6$

(g) $x = -3$

(h) $x = -\frac{1}{4}$

(i) $x = -3$

(j) $x = -\frac{1}{4}$

52)

(a) $(f \circ g)(x) = \sqrt{\frac{x^2+16}{x-2}}$

(b) $(g \circ f)(x) = \frac{x+16}{\sqrt{x}-2}$

(c) $(f \circ g)(3) = \sqrt{\frac{3^2+16}{3-2}} = 5$

(d) $(g \circ f)(4) = \frac{4+16}{\sqrt{4}-2} = \frac{20}{0} =$ undefined

53) x

54)
(a) $\log_5 26$
(b) $\log_7\left(\frac{x^3 y}{x+3}\right)$
(c) $\ln\left(\frac{z\sqrt{x}}{w^4}\right)$

55)
(a) $2\log_3(x+1) - \log_3 7 - \log_3 z$
(b) $\frac{1}{2}\ln 3 + \frac{1}{2}\ln a + \frac{1}{2}\ln b$

56)
$\log_b 2 = \log_b \frac{6}{3} = \log_b 6 - \log_b 3 = 1.3 - 0.8 = 0.5$

57) $\frac{\log 13}{\log 8} \approx 1.2335$

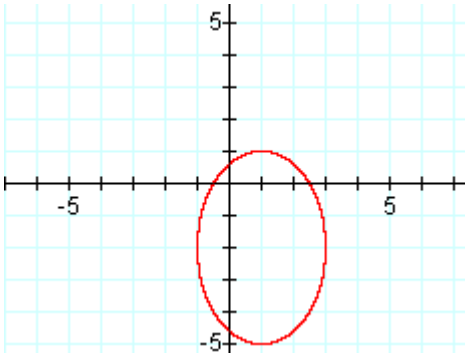
58)
(a) $x = \frac{2401}{3}$ or $x = 800\frac{1}{3}$
(b) $x = \frac{8}{7}$
(c) $x = 3$ ($x = -3$ is extraneous)
(d) $x = 4$ ($x = -1$ is extraneous)
(e) x=1 (x=-1 is extraneous)
(f) $x = \frac{-3+\sqrt{5}}{2}$ ($x = \frac{-3-\sqrt{5}}{2}$ is extraneous)
(g) $x = 1$

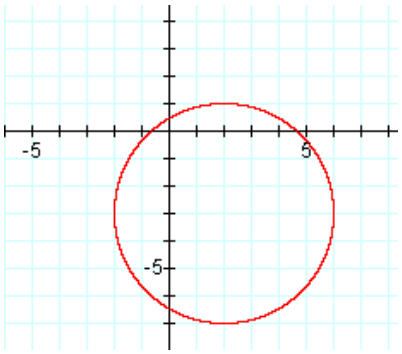
59)
(a) $x = \frac{1}{3}\left(\frac{\log 17}{\log 2} + 5\right)$
(b) $x \approx 3.0292$

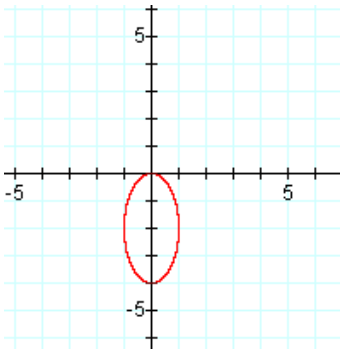
60)
(a) $x = \frac{7 + \ln 6}{3}$
(b) $x \approx 2.9306$

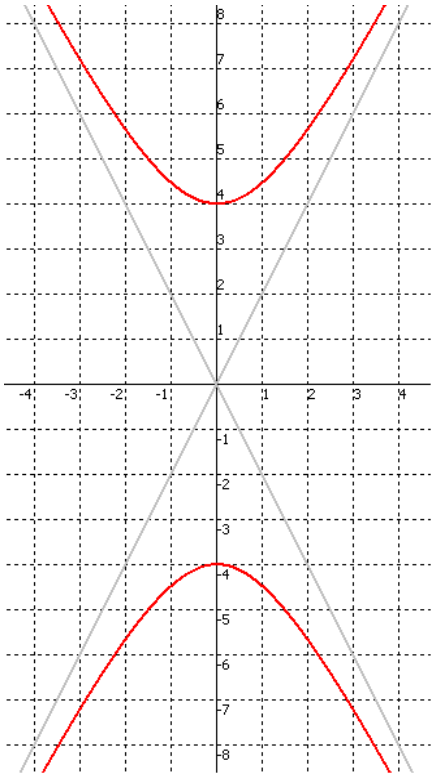
61) Vertex $(-8, 3)$, parabola opens right

62)
(a) ellipse
(b) hyperbola

63)
(a)


(b)


(c)


(d) 

64)

(a) (2, 1) and (1, –2)

(b) $\left(2\sqrt{2},\sqrt{3}\right),\left(-2\sqrt{2},\sqrt{3}\right)$
$\left(2\sqrt{2},-\sqrt{3}\right),\left(-2\sqrt{2},-\sqrt{3}\right)$

(c) (–2, 3)

65) $a_1=\frac{1}{2},\ a_2=\frac{4}{3},\ a_3=\frac{9}{4}$

66) $a_n=2n^2+3$

67)

(a) $\sum_{n=1}^{5}\frac{n}{n+1}$

(b) $\sum_{n=1}^{5}(-3+5n)$

68) $\frac{743}{840}$

69)

(a) 4

(b) 9

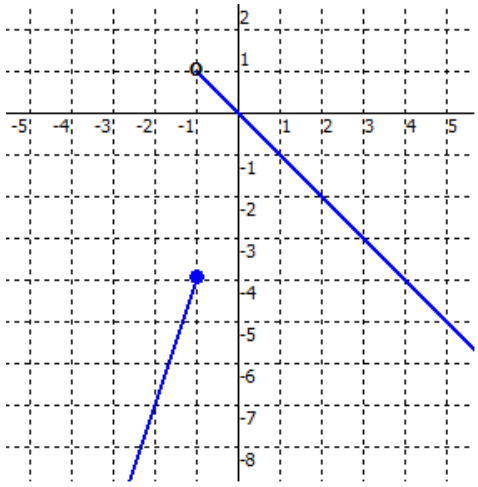
(c) $-\frac{1}{3}$

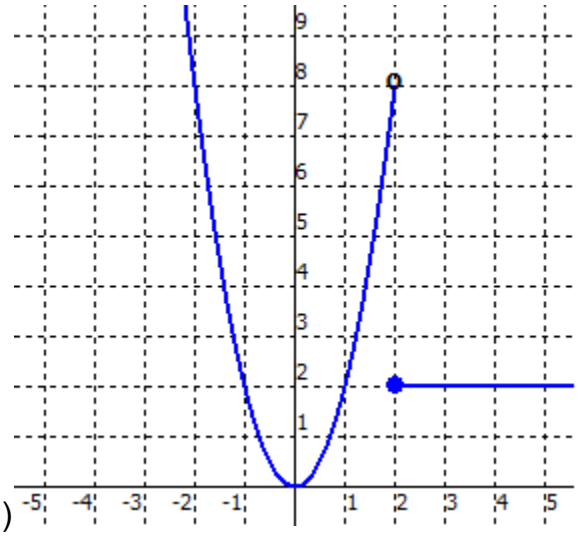
70)

(a) -4

(b) -3

(c) 1

71) 

72) 

73)

(a) $f^{-1}(x)=\frac{1}{4}\sqrt[3]{x+1}$

(b) $f^{-1}(x)=\frac{x^3+1}{64}$

(c) $f^{-1}(x)=\frac{\sqrt[3]{x}+1}{64}$

(d) $f^{-1}(x)=\left(\frac{x+1}{64}\right)^3$ or
$f^{-1}(x)=\frac{x^3+3x^2+3x+1}{262144}$

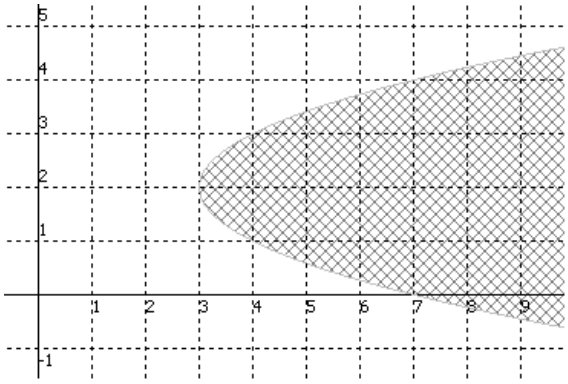
(e) $f^{-1}(x) = \left(\frac{x}{64}\right)^3 + 1$ or

$f^{-1}(x) = \frac{x^3}{262144} + 1$ or

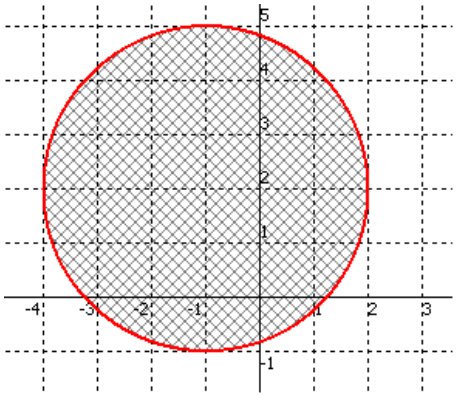
$f^{-1}(x) = \frac{x^3+262144}{262144}$

74)

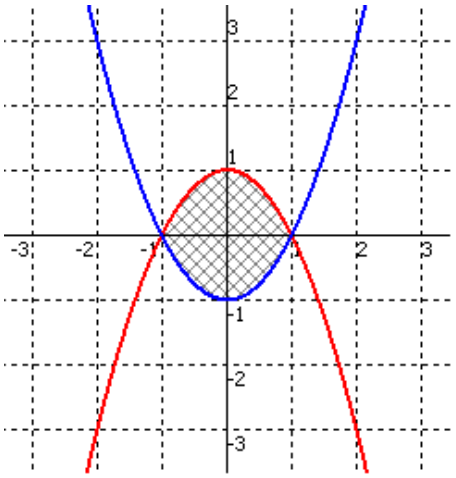
(a)



(b)



(b)



75)

(a)