

Name _____

Spring Semester Final Review (Dual)

Precalculus

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the relation represents a function. If it is a function, state the domain and range.

1) $\{(-3, -7), (2, 4), (4, 2), (6, -1)\}$

A) function

domain: $\{-7, 4, 2, -1\}$

range: $\{-3, 2, 4, 6\}$

B) function

domain: $\{-3, 2, 4, 6\}$

range: $\{-7, 4, 2, -1\}$

C) not a function

1) _____

Find the domain of the function.

2) $f(x) = \sqrt{12 - x}$

A) $\{x \mid x \neq 12\}$

B) $\{x \mid x \leq 12\}$

C) $\{x \mid x \leq 2\sqrt{3}\}$

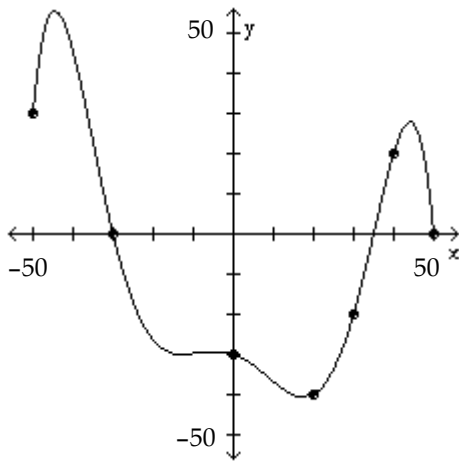
D) $\{x \mid x \neq 2\sqrt{3}\}$

2) _____

The graph of a function f is given. Use the graph to answer the question.

3) Use the graph of f given below to find $f(40)$.

3) _____



A) 40

B) 20

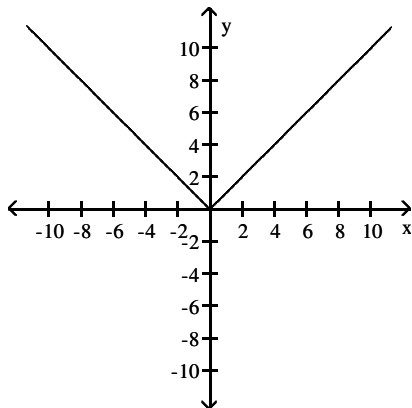
C) 70

D) 50

The graph of a function is given. Decide whether it is even, odd, or neither.

4)

4) _____



A) even

B) odd

C) neither

Determine algebraically whether the function is even, odd, or neither.

5) $f(x) = -5x^3$

A) even

B) odd

C) neither

5) _____

6) $f(x) = 6x^3 + 3$

A) even

B) odd

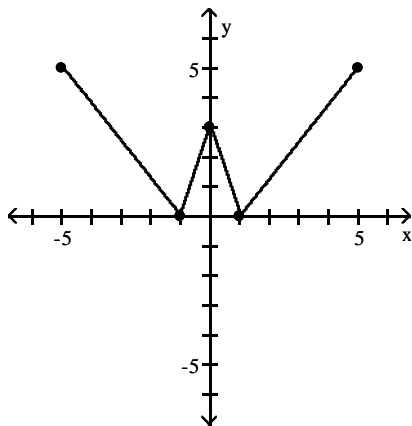
C) neither

6) _____

The graph of a function is given. Determine whether the function is increasing, decreasing, or constant on the given interval.

7) $(0, 1)$

7) _____



A) increasing

B) decreasing

C) constant

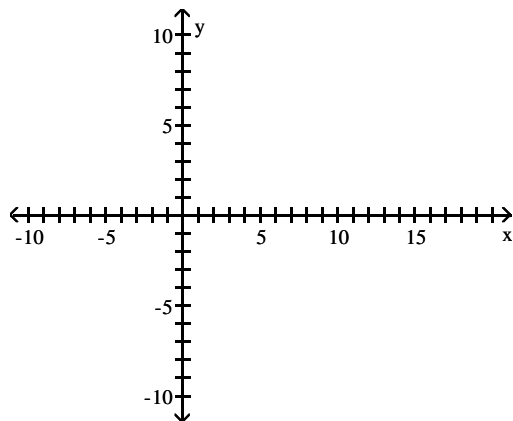
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the function.

8)

8) _____

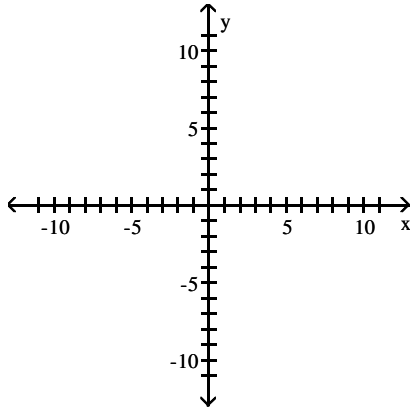
$$f(x) = \begin{cases} 1 & \text{if } 0 \leq x < 6 \\ |x| & \text{if } 6 \leq x < 9 \\ \sqrt[3]{x} & \text{if } 9 \leq x \leq 14 \end{cases}$$



Graph the function by starting with the graph of the basic function and then using the techniques of shifting, compressing, stretching, and/or reflecting.

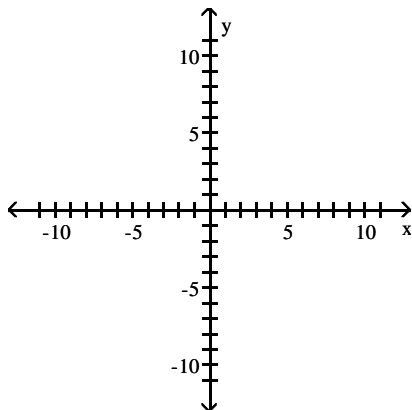
9) $f(x) = -2(x + 1)^2 + 2$

9) _____



10) $f(x) = \sqrt{x - 5} + 3$

10) _____

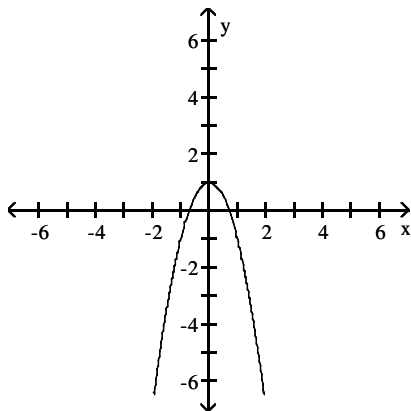


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Match the correct function to the graph.

11)

11) _____



A) $y = -2x^2 + 1$

B) $y = -2x^2 - 1$

C) $y = -2x^2$

D) $y = 1 - x^2$

Suppose the point (2, 4) is on the graph of $y = f(x)$. Find a point on the graph of the given function.

- 12) The reflection of the graph of $y = f(x)$ across the y -axis 12) _____
 A) (-2, -4) B) (2, 4) C) (-2, 4) D) (2, -4)

Use factoring to find the zeros of the quadratic function. List the x -intercepts of the graph of the function.

- 13) $F(x) = 2x^2 + 3x - 20$ 13) _____
 A) $x = -\frac{5}{2}, x = -4$ B) $x = \frac{5}{2}, x = -4$ C) $x = -\frac{5}{2}, x = 4$ D) $x = \frac{5}{2}, x = 4$

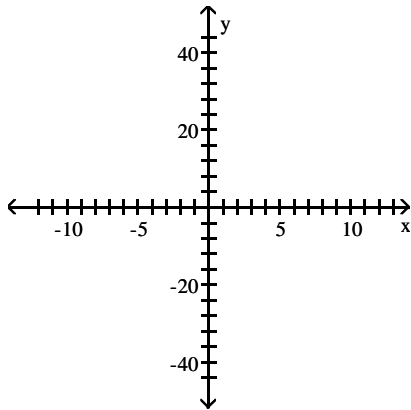
Find the vertex and axis of symmetry of the graph of the function.

- 14) $f(x) = x^2 + 4x - 5$ 14) _____
 A) (-2, 9); $x = -2$ B) (2, -9); $x = 2$ C) (2, 9); $x = 2$ D) (-2, -9); $x = -2$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the function using its vertex, axis of symmetry, and intercepts.

- 15) $f(x) = x^2 - 4x$ 15) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine, without graphing, whether the given quadratic function has a maximum value or a minimum value and then find that value.

- 16) $f(x) = x^2 + 2x - 7$ 16) _____
 A) minimum; -1 B) maximum; -8 C) minimum; -8 D) maximum; -1
- 17) $f(x) = -x^2 - 2x - 3$ 17) _____
 A) minimum; -2 B) minimum; -1 C) maximum; -1 D) maximum; -2

Find the zeros of the quadratic function using the Square Root Method. List the x -intercepts of the graph of the function.

- 18) $(x - 7)^2 - 25 = 0$ 18) _____
 A) $x = 32$ B) $x = -5, x = 5$ C) $x = -12, x = 2$ D) $x = 2, x = 12$

Find the real zeros, if any, of each quadratic function using the quadratic formula. List the x-intercepts, if any, of the graph of the function.

19) $g(x) = x^2 - 15 - 5x$

19) _____

A) $x = 5, x = 15$

B) $x = \frac{5 + \sqrt{85}}{2}$

C) $x = \frac{5 \pm \sqrt{85}}{2}$

D) No real zeros or x-intercepts

Find the zeros of the quadratic function by completing the square. List the x-intercepts of the graph of the function.

20) $f(x) = 4x^2 + 28x + 13$

20) _____

A) $x = \frac{1}{2}, x = \frac{13}{2}$

B) $x = -\frac{13}{2}, x = \frac{13}{2}$

C) $x = -\frac{1}{2}, x = -\frac{13}{2}$

D) $x = -\frac{1}{4}, x = -\frac{13}{4}$

Find the real zeros of the function. List the x-intercepts of the graph of the function.

21) $F(x) = x^4 - 5x^2 + 4$

21) _____

A) $x = -4, x = 4$

B) $x = -1, x = 1, x = -2, x = 2$

C) $x = -5, x = 5$

D) $x = -2, x = 2$

Solve the inequality.

22) $x^2 - 7x \geq -12$

22) _____

A) $(-\infty, 3]$

B) $[3, 4]$

C) $[4, \infty)$

D) $(-\infty, 3]$ or $[4, \infty)$

23) $x^2 - 6x \leq 0$

23) _____

A) $(-\infty, -6]$ or $[0, \infty)$

B) $[0, 6]$

C) $(-\infty, 0]$ or $[6, \infty)$

D) $[-6, 0]$

Solve the problem.

24) A projectile is thrown upward so that its distance above the ground after t seconds is

24) _____

$h = -11t^2 + 462t$. After how many seconds does it reach its maximum height?

A) 31.5 s

B) 42 s

C) 21 s

D) 10 s

25) The number of mosquitoes $M(x)$, in millions, in a certain area depends on the June rainfall x , in

25) _____

inches: $M(x) = 3x - x^2$. What rainfall produces the maximum number of mosquitoes?

A) 3 in.

B) 9 in.

C) 0 in.

D) 1.5 in.

Find the complex zeros of the quadratic function.

26) $h(x) = x^2 + 14x + 58$

26) _____

A) $x = -7 + 3i$

B) $x = -7 - 9i, x = -7 + 9i$

C) $x = -4, x = -10$

D) $x = -7 + 3i, x = -7 - 3i$

Without solving, determine the character of the solutions of the equation.

27) $x^2 - 8x + 7 = 0$

27) _____

A) a repeated real solution

B) two unequal real solutions

C) two complex solutions that are conjugates of each other

28) $x^2 - 2x + 3 = 0$

- A) two complex solutions that are conjugates of each other
- B) a repeated real solution
- C) two unequal real solutions

28) _____

Solve the equation.

29) $|x + 8| - 2 = 11$

- A) {17, 5}
- B) {-5, 5}
- C) {-21, 5}
- D) {-1, 5}

29) _____

Solve the problem.

30) $5 + 6i$ is a zero of a quadratic function with real coefficients. Find the other zero.

- A) 11
- B) $6i - 5$
- C) $-5 - 6i$
- D) $5 - 6i$

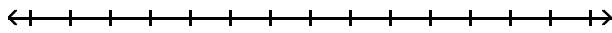
30) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the inequality. Express your answer using interval notation. Graph the solution set.

31) $|4k + 8| \leq 9$

31) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the x-intercepts to find the intervals on which the graph of f is above and below the x-axis.

32) $f(x) = (x + 2)^3$

- A) above the x-axis: no intervals
below the x-axis: $(-\infty, -2), (-2, \infty)$
- B) above the x-axis: $(-2, \infty)$
below the x-axis: $(-\infty, -2)$
- C) above the x-axis: $(-\infty, -2), (-2, \infty)$
below the x-axis: no intervals
- D) above the x-axis: $(-\infty, -2)$
below the x-axis: $(-2, \infty)$

32) _____

Find the domain of the rational function.

33) $g(x) = \frac{x + 8}{x^2 - 9}$

- A) $\{x \mid x \neq -3, x \neq 3, x \neq -8\}$
- B) all real numbers
- C) $\{x \mid x \neq -3, x \neq 3\}$
- D) $\{x \mid x \neq 0, x \neq 9\}$

33) _____

Find the vertical asymptotes of the rational function.

34) $f(x) = \frac{9x}{(x + 6)(x - 2)}$

- A) $x = -9$
- B) $x = -6, x = 2, x = -9$
- C) $x = -6, x = 2$
- D) $x = 6, x = -2$

34) _____

35) $R(x) = \frac{-3x^2}{x^2 + 2x - 24}$

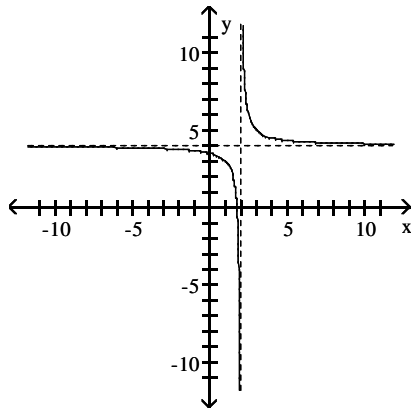
- A) $x = -24$
- B) $x = -6, x = 4, x = -3$
- C) $x = 6, x = -4$
- D) $x = -6, x = 4$

35) _____

Use the graph to find the vertical asymptotes, if any, of the function.

36)

36) _____



A) $x = 2$

B) $x = 2, x = 0$

C) $y = 4$

D) $x = 2, y = 4$

Give the equation of the horizontal asymptote, if any, of the function.

37) $f(x) = \frac{x + 4}{x^2 - 9}$

37) _____

A) $y = -3, y = 3$

B) $y = 1$

C) $y = 0$

D) no horizontal asymptotes

38) $g(x) = \frac{x^2 + 6x - 7}{x - 7}$

38) _____

A) $y = 0$

B) $y = 1$

C) $y = 7$

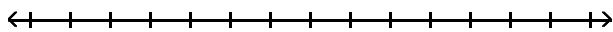
D) no horizontal asymptotes

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the inequality. Express your answer using interval notation. Graph the solution set.

39) $|4k - 1| + 5 > 9$

39) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

State whether the function is a polynomial function or not. If it is, give its degree. If it is not, tell why not.

40) $f(x) = -7x^3 + 2x^2 - 5$

40) _____

A) No; the last term has no variable

B) Yes; degree 3

C) Yes; degree 6

D) Yes; degree 5

Use synthetic or long division to perform the division.

41) $\frac{x^3 - x^2 + 7}{x + 2}$

41) _____

A) $x^2 - 2x + 6 + \frac{6}{x + 2}$

B) $x^2 - 3x + 6 + \frac{6}{x + 2}$

C) $x^2 + 3x + 6 + \frac{-5}{x + 2}$

D) $x^2 - 3x + 6 + \frac{-5}{x + 2}$

Use the remainder theorem and synthetic division to find $f(k)$.

42) $k = -3; f(x) = 3x^3 - 8x^2 - 3x + 24$

A) 33

B) -42

C) 36

D) -120

42) _____

Use synthetic division to decide whether the given number is a zero of the given polynomial.

43) 2; $f(x) = x^4 + 5x^2 - 36$

A) Yes

B) No

43) _____

44) 7i; $f(x) = x^3 + 5x^2 + 49x + 245$

A) Yes

B) No

44) _____

Form a polynomial whose zeros and degree are given.

45) Zeros: -3, -1, 2; degree 3

A) $f(x) = x^3 + 2x^2 - 5x - 6$ for $a = 1$

B) $f(x) = x^3 - 2x^2 + 5x - 6$ for $a = 1$

C) $f(x) = x^3 - 2x^2 - 5x + 6$ for $a = 1$

D) $f(x) = x^3 + 2x^2 + 5x + 6$ for $a = 1$

45) _____

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x-intercept.

46) $f(x) = 2(x - 3)(x + 3)^3$

A) 3, multiplicity 1, touches x-axis; -3, multiplicity 3

B) 3, multiplicity 1, crosses x-axis; -3, multiplicity 3, crosses x-axis

C) -3, multiplicity 1, touches x-axis; 3, multiplicity 3

D) -3, multiplicity 1, crosses x-axis; 3, multiplicity 3, crosses x-axis

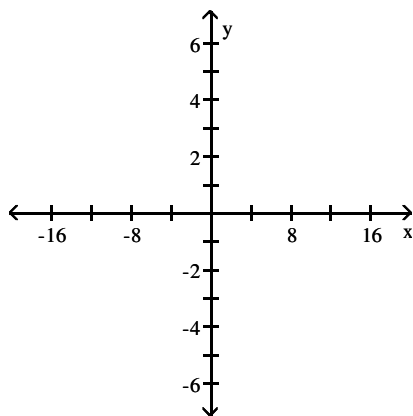
46) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the function.

47) $f(x) = \frac{(x + 3)(x + 5)}{x^2 - 36}$

47) _____

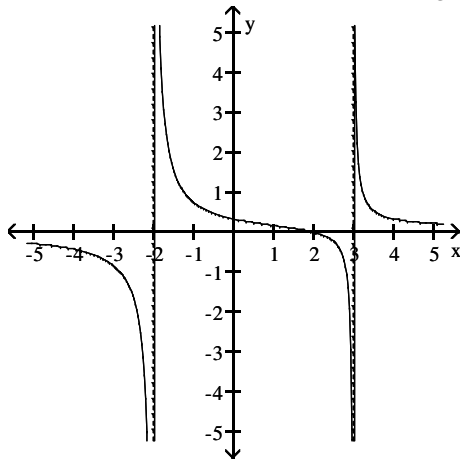


MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

48) Decide which of the rational functions might have the given graph.

48) _____



A) $R(x) = \frac{2 - x}{(x + 2)(x - 3)}$

B) $R(x) = \frac{x - 2}{(x + 2)(x - 3)}$

C) $R(x) = \frac{x + 2}{(x - 2)(x + 3)}$

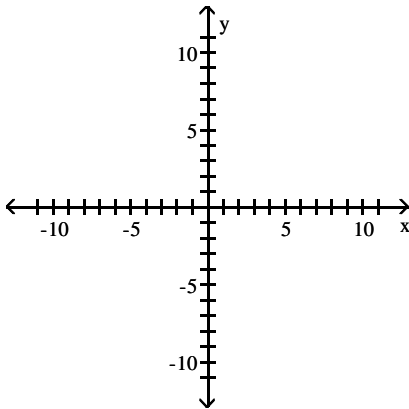
D) $R(x) = \frac{x - 2}{(x + 2)^2(x - 3)^2}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the function.

49) $f(x) = \frac{x^2 + 9}{x}$

49) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Give the equation of the oblique asymptote, if any, of the function.

50) $f(x) = \frac{2x^3 + 11x^2 + 5x - 1}{x^2 + 6x + 5}$

50) _____

A) $y = 0$

B) $y = 2x + 1$

C) $y = 2x - 1$

D) $y = 2x$

Solve the inequality.

51) $(x - 1)(x - 5) > 0$

51) _____

A) $(1, 5)$

B) $(5, \infty)$

C) $(-\infty, 1)$ or $(5, \infty)$

D) $(-\infty, 1)$

52) $x^2 - 5x \leq 0$

A) $[-5, 0]$

C) $(-\infty, 0]$ or $[5, \infty)$

B) $(-\infty, -5]$ or $[0, \infty)$

D) $[0, 5]$

52) _____

Use the Factor Theorem to determine whether $x - c$ is a factor of $f(x)$.

53) $f(x) = x^3 + 7x^2 - 16x + 18$; $x + 9$

A) Yes

B) No

53) _____

Give the maximum number of zeros the polynomial function may have. Use Descartes's Rule of Signs to determine how many positive and how many negative zeros it may have.

54) $f(x) = -6x^5 + x^3 - x^2 + 6$

A) 5; 3 or 1 positive zeros; 3 or 1 negative zeros

B) 5; 2 or 0 positive zeros; 3 or 1 negative zeros

C) 5; 2 or 0 positive zeros; 2 or 0 negative zeros

D) 5; 3 or 1 positive zeros; 2 or 0 negative zeros

54) _____

List the potential rational zeros of the polynomial function. Do not find the zeros.

55) $f(x) = 6x^4 + 4x^3 - 3x^2 + 2$

A) $\pm \frac{1}{6}, \pm \frac{1}{3}, \pm \frac{1}{2}, \pm \frac{2}{3}, \pm 1, \pm 2$

B) $\pm \frac{1}{2}, \pm \frac{3}{2}, \pm 1, \pm 2, \pm 3, \pm 6$

C) $\pm \frac{1}{6}, \pm \frac{1}{3}, \pm \frac{1}{2}, \pm 1, \pm 2$

D) $\pm \frac{1}{6}, \pm \frac{1}{3}, \pm \frac{1}{2}, \pm \frac{2}{3}, \pm 1, \pm 2, \pm 3$

55) _____

Use Descartes' Rule of Signs and the Rational Zeros Theorem to find all the real zeros of the polynomial function. Use the zeros to factor f over the real numbers.

56) $f(x) = x^4 - 3x^2 - 4$

A) 2; $f(x) = (x - 2)^2(x^2 + 1)$

B) -2, 2; $f(x) = (x - 2)(x + 2)(x^2 + 1)$

C) -1, 1; $f(x) = (x - 1)(x + 1)(x^2 + 4)$

D) -2, -1, 2, 1; $f(x) = (x - 2)(x + 2)(x - 1)(x + 1)$

56) _____

Solve the equation in the real number system.

57) $x^3 + 8x^2 + 19x + 12 = 0$

A) $\{3, 4\}$

B) $\{-4, -3, -1\}$

C) $\{1, 3, 4\}$

D) $\{-4, -3\}$

57) _____

58) $x^4 - 32x^2 - 144 = 0$

A) $\{-6, 6\}$

B) $\{-6, -2, 2, 6\}$

C) $\{-2, 2\}$

D) $\{-12, 12\}$

58) _____

Information is given about a polynomial $f(x)$ whose coefficients are real numbers. Find the remaining zeros of f .

59) Degree 3; zeros: $3, 4 - i$

A) $4 + i$

B) $-4 + i$

C) -3

D) no other zeros

59) _____

Form a polynomial $f(x)$ with real coefficients having the given degree and zeros.

60) Degree 3; zeros: $1 + i$ and -10

A) $f(x) = x^3 + x^2 - 18x + 20$

B) $f(x) = x^3 - 10x^2 - 18x - 12$

C) $f(x) = x^3 + 8x^2 + 20x - 18$

D) $f(x) = x^3 + 8x^2 - 18x + 20$

60) _____

Use the given zero to find the remaining zeros of the function.

61) $f(x) = x^4 - 12x^2 - 64$; zero: $-2i$

A) $2i, 4i, -4i$

B) $2i, 8, -8$

C) $2i, 4, -4$

D) $2i, 8i, -8i$

61) _____

Evaluate the expression using the values given in the table.

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

62) _____

x	1	5	11	12
f(x)	-4	11	3	15

x	-5	-4	1	4
g(x)	1	-7	5	11

A) 3

B) 5

C) 11

D) Undefined

Find the inverse of the function and state its domain and range .

63) $\{(7, -8), (5, -7), (3, -6), (1, -5)\}$

63) _____

A) $\{(-7, -8), (-8, 3), (7, 5), (-7, -6)\}$; $D = \{-7, -8, 7\}$; $R = \{-8, 3, 5, -6\}$

B) $\{(-7, -8), (-5, 3), (7, 3), (-7, -6)\}$; $D = \{-7, -5, 7\}$; $R = \{-8, 3, -6\}$

C) $\left\{ \left(7, -\frac{1}{8} \right), \left(5, -\frac{1}{7} \right), \left(3, -\frac{1}{6} \right), \left(1, -\frac{1}{5} \right) \right\}$; $D = \{7, 5, 3, 1\}$, $R = \left\{ -\frac{1}{8}, -\frac{1}{7}, -\frac{1}{6}, -\frac{1}{5} \right\}$

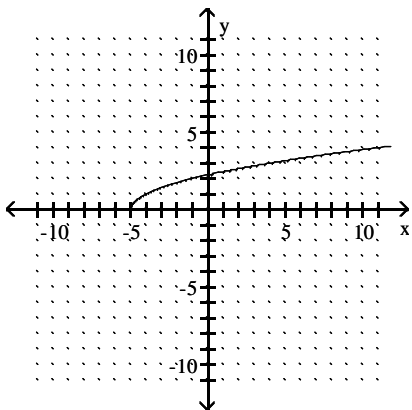
D) $\{(-8, 7), (-7, 5), (-6, 3), (-5, 1)\}$; $D = \{-8, -7, -6, -5\}$; $R = \{7, 5, 3, 1\}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

The graph of a one-to-one function f is given. Draw the graph of the inverse function f^{-1} as a dashed line or curve.

64) $f(x) = \sqrt{x+5}$

64) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Decide whether or not the functions are inverses of each other.

65) $f(x) = 4x + 16$, $g(x) = \frac{1}{4}x - 4$

65) _____

A) No

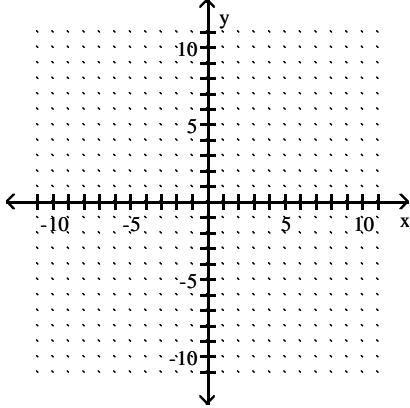
B) Yes

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use transformations to graph the function. Determine the domain, range, and horizontal asymptote of the function.

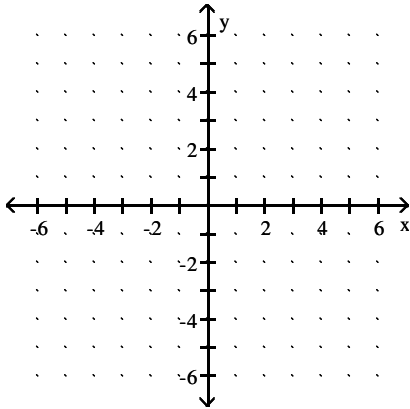
66) $f(x) = -2^{x+3} + 4$

66) _____



67) $f(x) = 4^{-x} + 3$

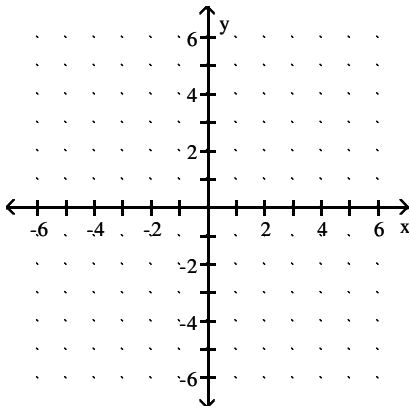
67) _____



Graph the function.

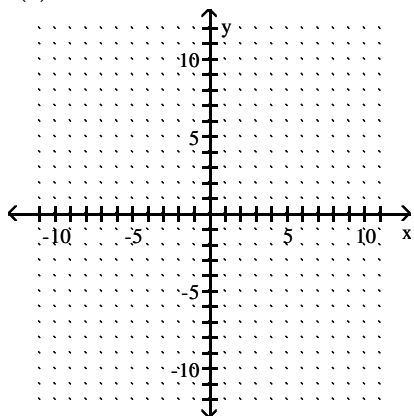
68) $f(x) = \left(\frac{5}{3}\right)^x$

68) _____



69) $f(x) = -1 + e^x$

69) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation.

70) $4^{1+2x} = 64$

A) {4}

B) {16}

C) {-1}

D) {1}

70) _____

71) $3^{-x} = \frac{1}{81}$

A) {-4}

B) $\left\{\frac{1}{4}\right\}$

C) $\left\{\frac{1}{27}\right\}$

D) {4}

71) _____

72) $e^{4x} - 1 = (e^2)^{-x}$

A) $\left\{\frac{1}{2}\right\}$

B) {0}

C) $\left\{\frac{3}{5}\right\}$

D) $\left\{\frac{1}{6}\right\}$

72) _____

Change the exponential expression to an equivalent expression involving a logarithm.

73) $6^3 = 216$

A) $\log_3 216 = 6$

B) $\log_6 216 = 3$

C) $\log_{216} 6 = 3$

D) $\log_6 3 = 216$

73) _____

74) $32^{2/5} = 4$

A) $\frac{\log_5 4}{\log_2 32} = 32$

B) $\log_{32} 4 = \frac{2}{5}$

C) $\log_2 32 = \frac{2}{5}$

D) $\log_4 32 = \frac{2}{5}$

74) _____

Find the exact value of the logarithmic expression.

75) $\log_8 \frac{1}{64}$

A) -8

B) 8

C) -2

D) 2

75) _____

76) $\log_8 1$

A) $\frac{1}{8}$

B) 8

C) 1

D) 0

76) _____

77) $\log_8 \sqrt{8}$

77) _____

A) 1

B) $\frac{1}{8}$

C) 8

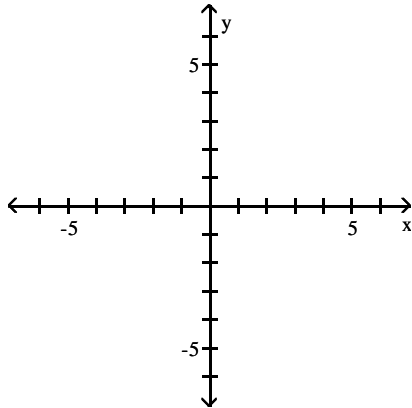
D) $\frac{1}{2}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the function.

78) $y = \log_{1/2} x$

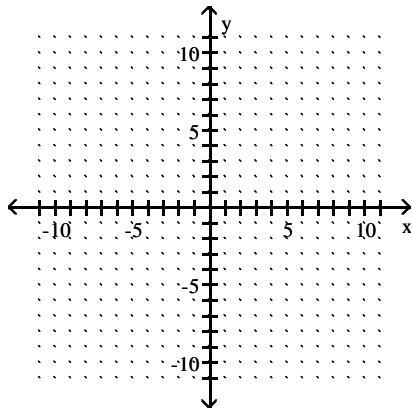
78) _____



Use transformations to graph the function.

79) Use the graph of $\log_2 x$ to obtain the graph of $f(x) = -1 + \log_2 x$.

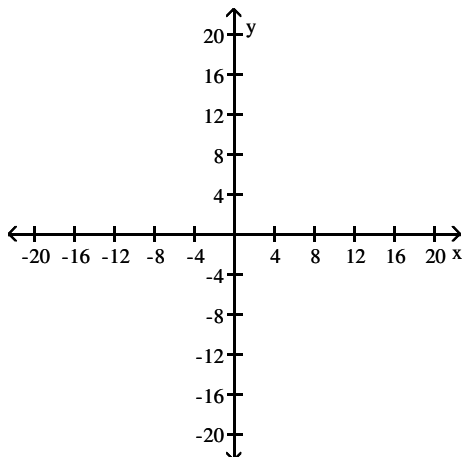
79) _____



Use transformations to graph the function. Determine the domain, range, and vertical asymptote of the function.

80) $h(x) = 3 + \log(x + 4)$

80) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation.

81) $\log_3 27 = x$ 81) _____
A) {9} B) {3} C) {81} D) {30}

82) $\log_5 (x + 1) = -1$ 82) _____
A) $\left\{-\frac{4}{5}\right\}$ B) {6} C) $\left\{\frac{6}{5}\right\}$ D) {-4}

83) $9 + 3 \ln x = 14$ 83) _____
A) $\left\{\ln\left(\frac{5}{3}\right)\right\}$ B) $\left\{\frac{e^5}{3}\right\}$ C) $\{e^{5/3}\}$ D) $\left\{\frac{5}{3 \ln 1}\right\}$

Use the properties of logarithms to find the exact value of the expression. Do not use a calculator.

84) $\log_2 2^{5.44}$ 84) _____
A) 0.184 B) 2 C) 5.44 D) 546

85) $\log_{70} 10 + \log_{70} 7$ 85) _____
A) 1 B) 7 C) 10 D) 70

86) $\log_2 16 - \log_2 8$ 86) _____
A) 8 B) 2 C) 1 D) 16

Write as the sum and/or difference of logarithms. Express powers as factors.

87) $\log_{13} \frac{6\sqrt{x}}{y}$ 87) _____

- A) $\log_{13} y - \log_{13} 6 - \frac{1}{2} \log_{13} x$ B) $\log_{13} (6\sqrt{x}) - \log_{13} y$
C) $\log_{13} 6 \cdot \frac{1}{2} \log_{13} x + \log_{13} y$ D) $\log_{13} 6 + \frac{1}{2} \log_{13} x - \log_{13} y$

88) $\log_3 \frac{\sqrt[8]{5}}{q^2 p}$ 88) _____

- A) $\frac{1}{8} \log_3 5 - 2 \log_3 q - \log_3 p$ B) $\log_3 5 - \log_3 q - \log_3 p$
C) $8 \log_3 5 - 2 \log_3 q - \log_3 8$ D) $\frac{1}{8} \log_3 5 - 2 \log_3 q - 2 \log_3 p$

Express as a single logarithm.

89) $9 \log_c 2 + 6 \log_c 5$ 89) _____

A) $\log_c (18 + 30)$

B) $\log_c 2^9 \cdot \log_c 5^6$

C) $\log_c \frac{2^9}{5^6}$

D) $\log_c 2^9 5^6$

90) $3 \log_6 x + 5 \log_6 (x - 6)$ 90) _____

A) $\log_6 x(x - 6)^{15}$

B) $\log_6 x^3(x - 6)^5$

C) $\log_6 x(x - 6)$

D) $15 \log_6 x(x - 6)$

Use the Change-of-Base Formula and a calculator to evaluate the logarithm. Round your answer to three decimal places.

91) $\log_6 9.84$ 91) _____

A) 1.640

B) 0.993

C) 1.276

D) 0.784

Solve the equation.

92) $\log_3 x + \log_3(x - 24) = 4$ 92) _____

A) {53}

B) No real solutions

C) {-3, 27}

D) {27}

93) $\log_5 (x + 1) = 1 + \log_5 (x - 3)$ 93) _____

A) {4}

B) {-1}

C) {1}

D) {-4}

94) $2(7 - 3x) = \frac{1}{4}$ 94) _____

A) $\left\{\frac{1}{2}\right\}$

B) {1}

C) {-3}

D) {3}

Solve the exponential equation. Express the solution set in terms of natural logarithms.

95) $3^{6x} = 4.3$ 95) _____

A) $\left\{\frac{6 \ln 4.3}{\ln 3}\right\}$

B) $\left\{\frac{4.3 \ln 6}{\ln 3}\right\}$

C) $\left\{\frac{\ln 4.3}{3 \ln 6}\right\}$

D) $\left\{\frac{\ln 4.3}{6 \ln 3}\right\}$

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

96) $3^{x+6} = 4$ 96) _____

A) {-4.74}

B) {1.57}

C) {-0.65}

D) {6.79}

97) $e^{5x} = 3$ 97) _____

A) {0.54}

B) {1.63}

C) {5.49}

D) {0.22}

Solve the problem. Round your answer to three decimals.

98) How long will it take for an investment to double in value if it earns 8.75% compounded continuously? 98) _____

A) 3.961 years

B) 12.556 years

C) 7.922 years

D) 8.244 years

Solve the problem.

- 99) How long does it take \$1125 to triple if it is invested at 7% interest, compounded quarterly? Round your answer to the nearest tenth. 99) _____
A) 15.8 months B) 15.8 years C) 18.1 months D) 18.1 years
- 100) The half-life of silicon-32 is 710 years. If 40 grams is present now, how much will be present in 900 years? (Round your answer to three decimal places.) 100) _____
A) 36.635 B) 0.006 C) 0 D) 16.614
- 101) The size P of a small herbivore population at time t (in years) obeys the function $P(t) = 800e^{0.2t}$ if they have enough food and the predator population stays constant. After how many years will the population reach 1600? 101) _____
A) 10.4 yrs B) 3.47 yrs C) 8.47 yrs D) 33.42 yrs

Find the n th term and the indicated term of the arithmetic sequence whose initial term, a , and common difference, d , are given.

- 102) $a = 10$; $d = 8$ 102) _____
 $a_n = ?$; $a_{16} = ?$
A) $a_n = 2 + 8n$; $a_{16} = 58$ B) $a_n = 2 + 8n$; $a_{16} = 130$
C) $a_n = 2 - 8n$; $a_{16} = 130$ D) $a_n = 10 + 8n$; $a_{16} = 130$

Find the sum of the arithmetic sequence.

- 103) $(-6) + (-1) + 4 + 9 + \dots + 39$ 103) _____
A) 330 B) 170 C) 160 D) 165

Determine whether the sequence is geometric.

- 104) 4, 12, 36, 108, 324, ... 104) _____
A) Geometric B) Not geometric

Find the n th term of the geometric sequence.

- 105) $a = 3$; $r = -3$ 105) _____
A) $a_n = 3 \cdot 3^{n-1}$ B) $a_n = 3 \cdot -3^{n-1}$ C) $a_n = 3 \cdot -3^n$ D) $a_n = -3 \cdot 3^{n-1}$

- 106) 4, 2, 1, $\frac{1}{2}$, $\frac{1}{4}$ 106) _____

- A) $a_n = 4 \cdot \left(\frac{1}{2}\right)^n$ B) $a_n = 4 \cdot \left(\frac{1}{4}\right)^{n-1}$
C) $a_n = 4 \cdot \left(\frac{1}{2}\right)^{n-1}$ D) $a_n = 4 \cdot \left(\frac{1}{2}\right)^{n+1}$

Find the sum.

- 107) $\sum_{k=1}^5 \left(\frac{4}{3}\right)(4)^k$ 107) _____
A) $\frac{5396}{3}$ B) $\frac{5456}{3}$ C) $\frac{5486}{3}$ D) $\frac{5411}{3}$

Find the sum of the infinite geometric series.

108) $4 + 2 + 1 + \dots$

A) 2

B) 8

C) 6

D) 4

108) _____

109)

$$\sum_{k=1}^{\infty} 4 \left(\frac{2}{3}\right)^{k-1}$$

A) $\frac{8}{3}$

B) 12

C) 16

D) 4

109) _____

Find the sum of the arithmetic sequence.

110) $6 + 12 + 18 + \dots + 504$

A) 21168

B) 21675

C) 21420

D) 20916

110) _____

Solve the equation.

111) $\frac{4}{x-2} = 1 + \frac{6}{x+2}$

A) $\{-4, 6\}$

B) $\{-6, 6\}$

C) $\{4, -6\}$

D) \emptyset

111) _____

112) $\sqrt{x+3} = x-3$

A) $\{6, 13\}$

B) $\{1, 6\}$

C) $\{6\}$

D) $\{1, 13\}$

112) _____

113) $\sqrt{2x+3} - \sqrt{x+1} = 1$

A) $\{3\}$

B) $\{3, -1\}$

C) $\{-3, -1\}$

D) \emptyset

113) _____

Evaluate the expression.

114) $\binom{9}{7}$

A) 18

B) 36

C) 1

D) 72

114) _____

Find the indicated coefficient or term.

115) The 3rd term in the expansion of $(4x + 2)^3$

A) $48x$

B) 4

C) $96x^2$

D) $96x$

115) _____

116) The 8th term in the expansion of $(x + 3y)^{11}$

A) $721,710x^7y^4$

B) $240,570x^7y^4$

C) $240,570x^4y^8$

D) $721,710x^4y^7$

116) _____

Expand the expression using the Binomial Theorem.

117) $(x + 9)^5$

A) $x^5 + 45x^4 + 1620x^3 + 14,580x^2 + 32,805x + 9$

B) $x^5 + 45x^4 + 810x^3 + 7290x^2 + 32,805x + 9$

C) $x^5 + 45x^4 + 810x^3 + 7290x^2 + 32,805x + 59,049$

D) $x^5 + 45x^4 + 1620x^3 + 14,580x^2 + 32,805x + 59,049$

117) _____

118) $(2x - 5y)^3$

A) $8x^3 - 20x^2y + 50xy^2 - 125y^3$

C) $8x^3 - 60x^2y + 150xy^2 - 125y^3$

B) $4x^3y - 20x^2y^2 + 25xy^3$

D) $4x^3y - 10x^2y^2 + 25xy^3$

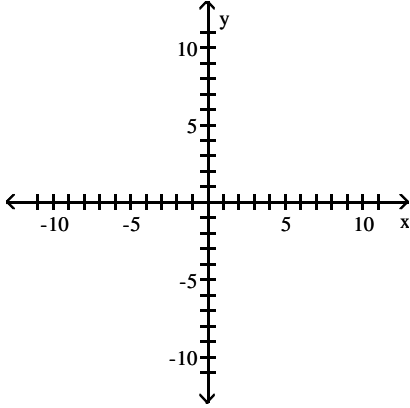
118) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the vertex, focus, and directrix of the parabola. Graph the equation.

119) $(y - 1)^2 = -8(x + 2)$

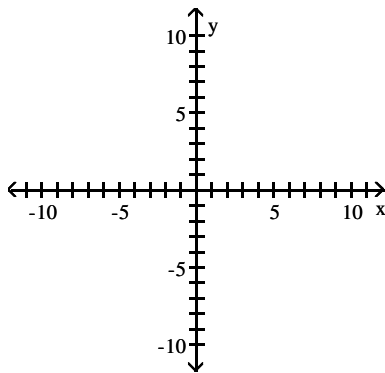
119) _____



Graph the equation.

120) $\frac{(x - 2)^2}{9} + \frac{(y + 1)^2}{4} = 1$

120) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write the partial fraction decomposition of the rational expression.

121) $\frac{x - 8}{(x - 4)(x - 5)}$

121) _____

A) $\frac{-3}{x - 4} + \frac{4}{x - 5}$

B) $\frac{4}{x - 4} + \frac{-3}{x - 5}$

C) $\frac{4}{x - 4} + \frac{3}{x - 5}$

D) $\frac{3}{x - 4} + \frac{-4}{x - 5}$

122) $\frac{6x^2 - x - 13}{x(x + 1)(x - 1)}$

122) _____

A) $\frac{13}{x} + \frac{3}{x + 1} + \frac{-4}{x - 1}$

B) $\frac{13}{x} + \frac{-4}{x + 1} + \frac{3}{x - 1}$

C) $\frac{13}{x} + \frac{-3}{x + 1} + \frac{-4}{x - 1}$

D) $\frac{13}{x} + \frac{-3}{x + 1} + \frac{4}{x - 1}$

$$123) \frac{x+4}{x^3 - 2x^2 + x}$$

123) _____

$$A) \frac{4}{x} + \frac{5}{x-1} + \frac{-4}{(x-1)^2}$$

$$B) \frac{-4}{x} + \frac{4}{x-1} + \frac{5}{(x-1)^2}$$

$$C) \frac{4}{x} + \frac{-4}{x-1} + \frac{9}{(x-1)^2}$$

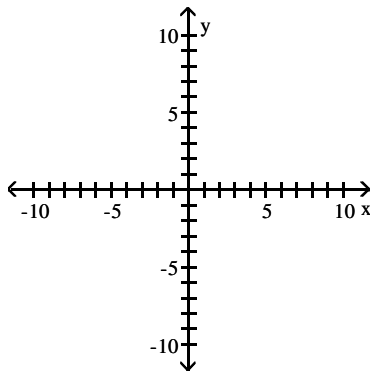
$$D) \frac{4}{x} + \frac{-4}{x-1} + \frac{5}{(x-1)^2}$$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Graph the hyperbola.

$$124) \frac{(x-1)^2}{4} - \frac{(y-1)^2}{16} = 1$$

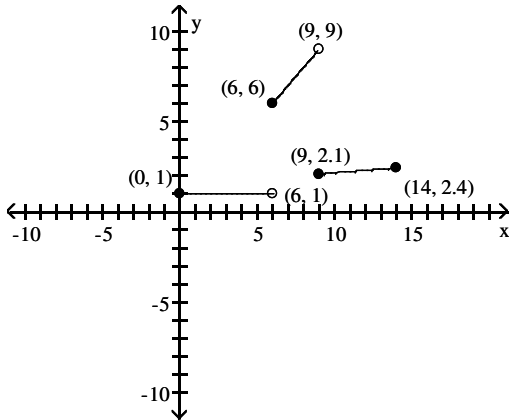
124) _____



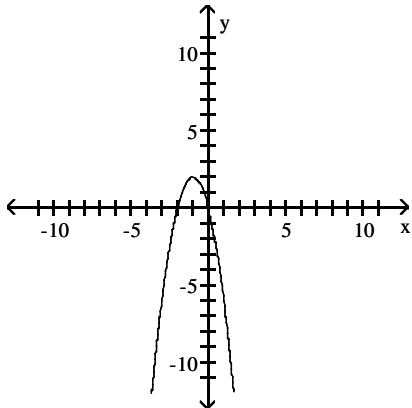
Answer Key

Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

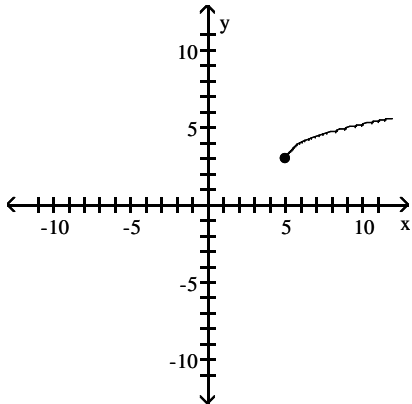
- 1) B
- 2) B
- 3) B
- 4) A
- 5) B
- 6) C
- 7) B
- 8)



9)



10)



- 11) A
- 12) C
- 13) B

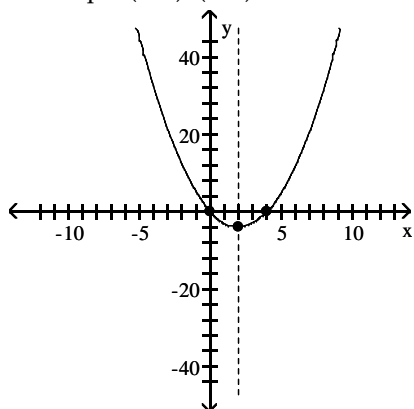
Answer Key

Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

14) D

15) vertex (2, -4)

intercepts (0, 0), (4, 0)



16) C

17) D

18) D

19) C

20) C

21) B

22) D

23) B

24) C

25) D

26) D

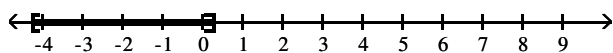
27) B

28) A

29) C

30) D

31) $[-\frac{17}{4}, \frac{1}{4}]$



32) B

33) C

34) C

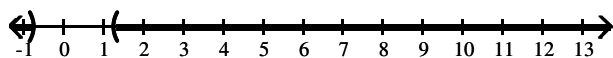
35) D

36) A

37) C

38) D

39) $(-\infty, -\frac{3}{4}) \cup (\frac{5}{4}, \infty)$



40) B

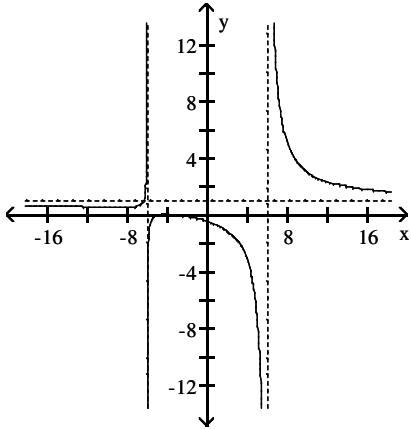
41) D

42) D

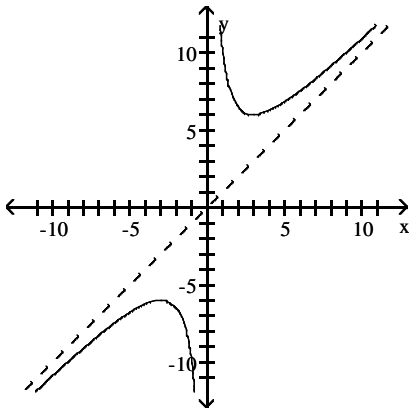
Answer Key

Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

- 43) A
- 44) A
- 45) A
- 46) B
- 47)



- 48) B
- 49)

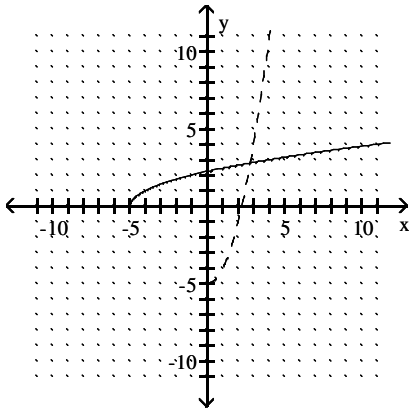


- 50) C
- 51) C
- 52) D
- 53) A
- 54) D
- 55) A
- 56) B
- 57) B
- 58) A
- 59) A
- 60) D
- 61) C
- 62) A
- 63) D

Answer Key

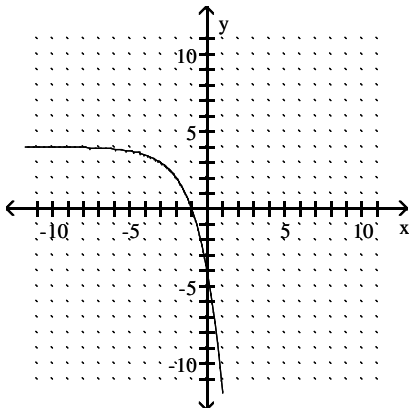
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64)



65) B

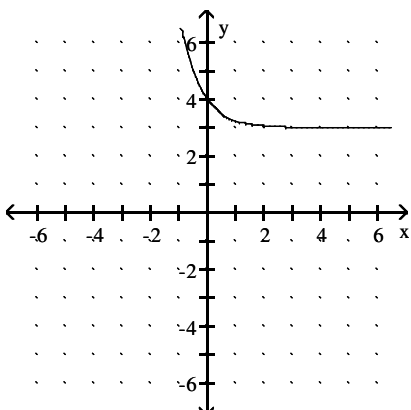
66)



domain of f : $(-\infty, \infty)$; range of f : $(-\infty, 4)$;

horizontal asymptote: $y = 4$

67)



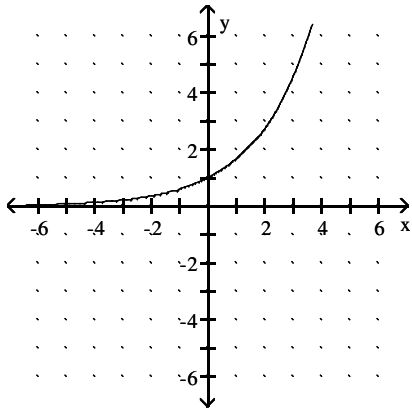
domain of f : $(-\infty, \infty)$; range of f : $(3, \infty)$

horizontal asymptote: $y = 3$

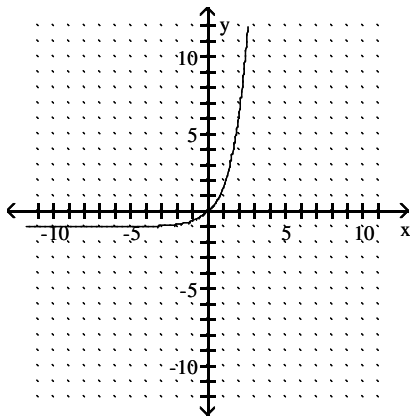
Answer Key

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68)



69)



70) D

71) D

72) D

73) B

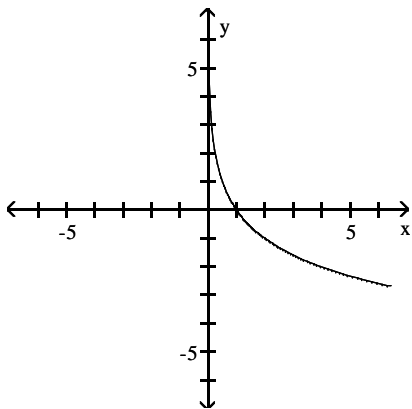
74) B

75) C

76) D

77) D

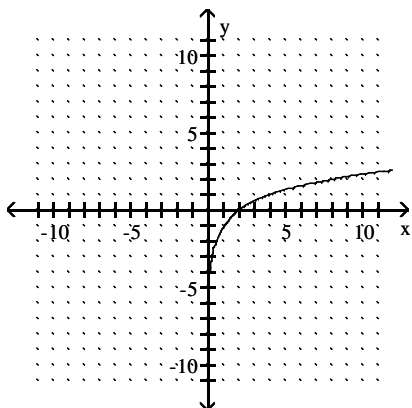
78)



Answer Key

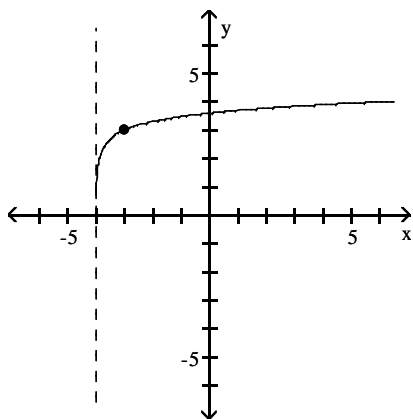
Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

79)



80)

$x = -4$



domain $(-4, \infty)$

range $(-\infty, \infty)$

vertical asymptote $x = -4$

- 81) B
- 82) A
- 83) C
- 84) C
- 85) A
- 86) C
- 87) D
- 88) A
- 89) D
- 90) B
- 91) C
- 92) D
- 93) A
- 94) D
- 95) D
- 96) A
- 97) D
- 98) C
- 99) B
- 100) D

Answer Key

Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

101) B

102) B

103) D

104) A

105) B

106) C

107) B

108) B

109) B

110) C

111) C

112) C

113) B

114) B

115) A

116) D

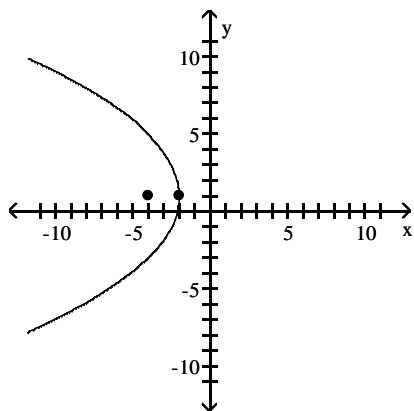
117) C

118) C

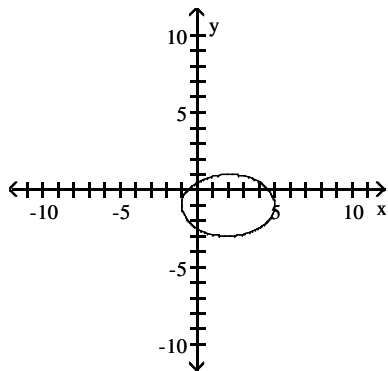
119) vertex: $(-2, 1)$

focus: $(-4, 1)$

directrix: $x = 0$



120)



121) B

122) C

123) D

Answer Key

Testname: PRECAL SPRING SEMESTER FINAL EXAM AHS

124)

