Math 1314 Test 3 Review

Name_____

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

Find the coordinates of the vertex for the parabola defined by the given quadratic function.

1) $f(x) = (x - 5)^2 - 5$ 1) _____

A) (0, -5) B) (5, 5) C) (5, -5) D) (-5, 0)

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

2) $f(x) = x^2 - 8x - 6$ 2) _____

Find the axis of symmetry of the parabola defined by the given quadratic function.

3) $f(x) = 11(x - 2)^2 + 7$ 3) _____

Determine whether the given quadratic function has a minimum value or maximum value. Then find the coordinates of the minimum or maximum point.

4) $f(x) = x^2 + 2x - 8$ 4) _____

5) $f(x) = -4x^2 - 12x$ 5) _____

Solve the problem.

6) The cost in millions of dollars for a company to manufacture x thousand automobiles is given by the function $C(x) = 4x^2 - 32x + 128$. Find the number of automobiles that must be produced to minimize the cost. 6) _____

7) An arrow is fired into the air with an initial velocity of 64 feet per second. The height in feet of the arrow t seconds after it was shot into the air is given by the function $h(x) = -16t^2 + 64t$. Find the maximum height of the arrow. 7) _____

Use the Leading Coefficient Test to determine the end behavior of the polynomial function.

8) $f(x) = -5(x^2 + 3)(x + 5)^2$ 8) _____

9) $f(x) = -4x^4 - 5x^3 + 2x^2 + 5x - 1$ 9) _____

Find the zeros of the polynomial function.

10) $f(x) = x^3 + x^2 - 30x$ 10) _____

Find the zeros for the polynomial function and give the multiplicity for each zero. State whether the graph crosses the x-axis or touches the x-axis and turns around, at each zero.

11) $f(x) = x^3 + 6x^2 - x - 6$ 11) _____

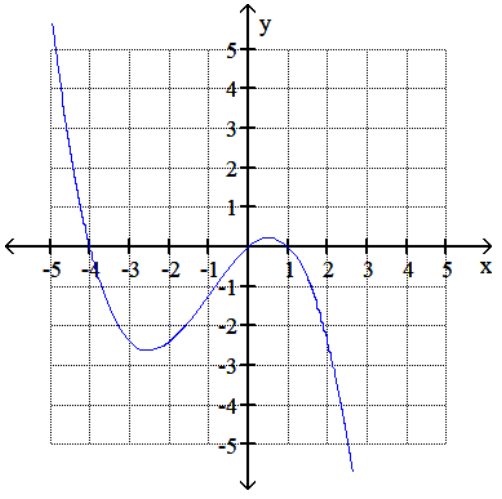
12) $f(x) = 4(x - 3)(x + 6)^4$ 12) _____

Write the equation of a polynomial function with the given characteristics. Use a leading coefficient of 1 or -1 and make the degree of the function as small as possible.

13) Crosses the x-axis at -4, 0, and 2; lies above the x-axis between -4 and 0; lies below the x-axis between 0 and 2. 13) _____

Determine if the graph can represent a polynomial function. If so, assume the end behavior and all turning points are represented on the graph.

14) 14) _____



a. Determine the minimum degree of the polynomial based on the number of turning points.

b. Determine whether the leading coefficient is positive or negative based on the end behavior and whether the degree of the polynomial is odd or even.

c. Approximate the real zeros of the function, and determine if their multiplicity is odd or even.

Determine the maximum possible number of turning points for the graph of the function.

15) $f(x) = 5x^7 + 4x^6 - 5x - 11$ 15) _____

Divide using synthetic division.

16) $(x^2 + 8x + 12) \div (x + 5)$ 16) _____

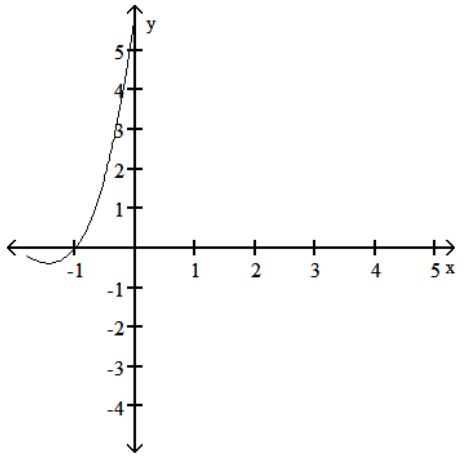
Use synthetic division and the Remainder Theorem to find the indicated function value.

17) $f(x) = x^4 - 8x^3 + 4x^2 + 6x - 3$; $f(2)$ 17) _____

18) $f(x) = 4x^3 - 7x^2 - 5x + 8$; $f(-2)$ 18) _____

Use the graph or table to determine a solution of the equation. Use synthetic division to verify that this number is a solution of the equation. Then solve the polynomial equation.

19) $x^3 + 6x^2 + 11x + 6 = 0$ 19) _____



Use the factor theorem to determine if the given binomial is a factor of $f(x)$.

20) $f(x) = x^4 + 8x^3 + 11x^2 - 11x + 3; \quad x + 3$ 20) _____

Use the Rational Zero Theorem to list all possible rational zeros for the given function.

21) $f(x) = x^5 - 3x^2 + 6x + 35$ 21) _____

22) $f(x) = -2x^3 + 3x^2 - 4x + 8$ 22) _____

Solve the problem.

23) Solve the equation $12x^3 - 71x^2 + 56x - 10 = 0$ given that $\frac{2}{3}$ is a root. 23) _____

Write a polynomial $f(x)$ that meets the given conditions. Answers may vary.

24) Degree 3 polynomial with zeros -2 and $-5i$ 24) _____

Find an nth degree polynomial function with real coefficients satisfying the given conditions.

25) n = 4; 2i, 7, and -7 are zeros; leading coefficient is 1 25) _____

Find the domain of the rational function.

26) $g(x) = \frac{x + 6}{x^2 - 9x}$ 26) _____

Find the vertical asymptotes, if any, of the graph of the rational function.

27) $\frac{x - 64}{x^2 - 10x + 24}$ 27) _____

28) $g(x) = \frac{x}{x^2 - 16}$ 28) _____

Find the horizontal asymptote, if any, of the graph of the rational function.

29) $f(x) = \frac{6x}{2x^2 + 1}$ 29) _____

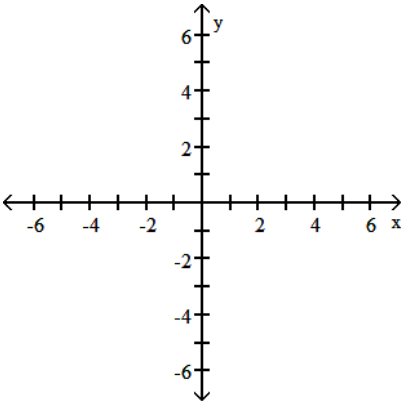
30) $g(x) = \frac{25x^2}{5x^2 + 1}$ 30) _____

31) $f(x) = \frac{-15x}{5x^3 + x^2 + 1}$ 31) _____

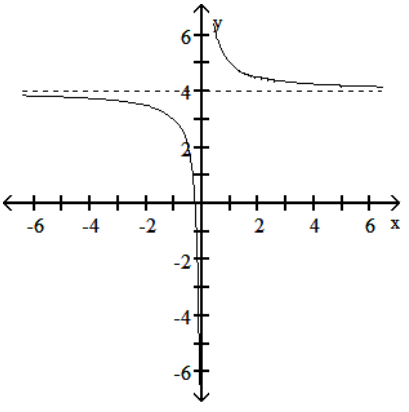
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use transformations of $f(x) = \frac{1}{x}$ or $f(x) = \frac{1}{x^2}$ to graph the rational function.

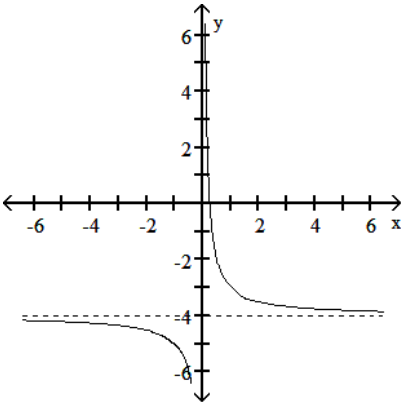
32) $f(x) = \frac{1}{x} - 4$ 32) _____



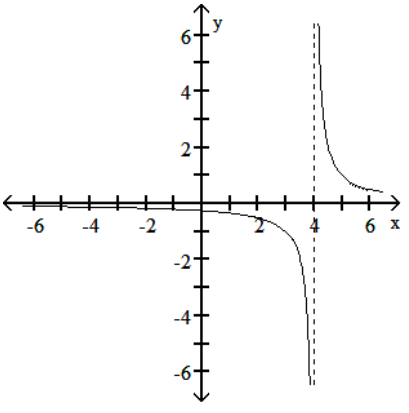
A)



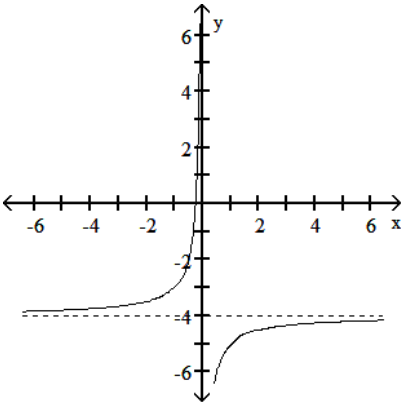
B)



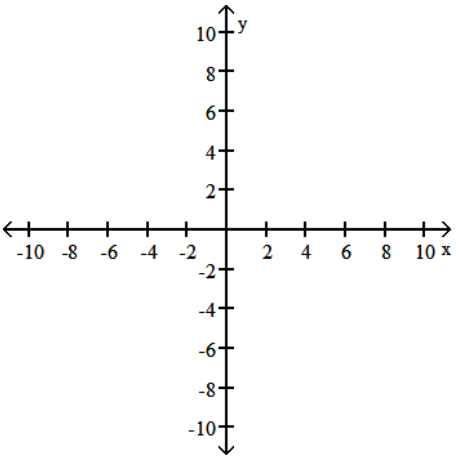
C)



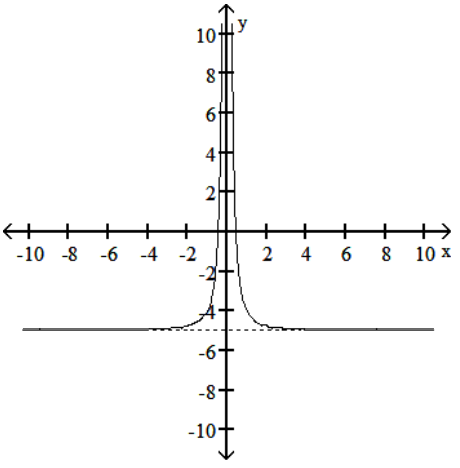
D)



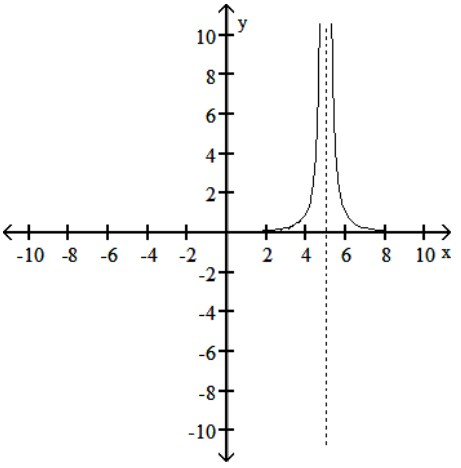
33) $g(x) = \dfrac{1}{(x - 5)^2}$ 33) _____



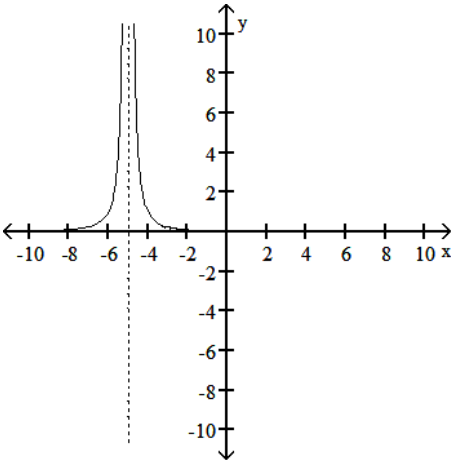
A)



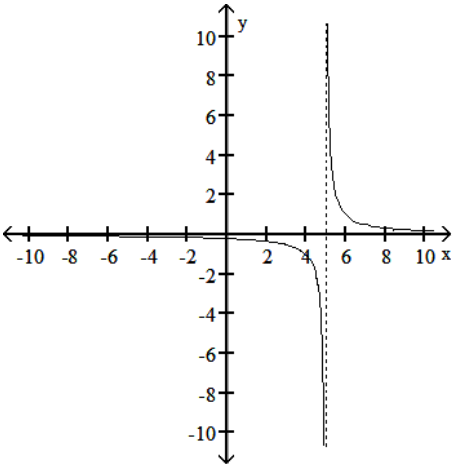
B)



C)



D)



1) C
2) (4, -22)
3) x = 2
4) minimum; $(-1, -9)$
5) maximum; $\left(-\frac{3}{2}, 9\right)$
6) 4 thousand automobiles
7) 64 ft
8) falls to the left and falls to the right
9) falls to the left and falls to the right
10) x = 0, x = - 6, x = 5
11) -1, multiplicity 1, crosses the x-axis;
    1, multiplicity 1, crosses the x-axis;
    - 6, multiplicity 1, crosses the x-axis.
12) 3, multiplicity 1, crosses x-axis; -6, multiplicity 4, touches x-axis and turns around
13) $f(x) = x^3 + 2x^2 - 8x$
14) **a.** Minimum degree 3
    b. Leading coefficient negative degree odd
    c. -4, 0, and 1 (each with odd multiplicity)
15) 6
16) $x + 3 - \frac{3}{x + 5}$
17) -23
18) -42
19) -1; The remainder is zero; -1, -2, and -3, or {-3, -2, -1}
20) Yes
21) ± 1, ± 7, ± 5, ± 35
22) $\pm\frac{1}{2}, \pm 1, \pm 2, \pm 4, \pm 8$
23) $\left\{\frac{2}{3}, \frac{1}{4}, 5\right\}$
24) $f(x) = x^3 + 2x^2 + 25x + 50$
25) $f(x) = x^4 - 45x^2 - 196$
26) $\{x \mid x \neq 0, x \neq 9\}$
27) x = 4, x = 6
28) x = 4, x = -4
29) y = 0
30) y = 5
31) y = 0
32) B
33) B