St Ambrose University
Department of Mathematics
Math 151 Exam 2

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question(5 pts each). NO CALCULATORS OF ANY KIND ALLOWED.

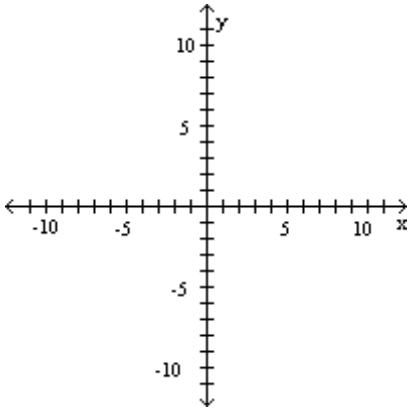
Find the vertex and axis of symmetry of the graph of the function.

1) $f(x) = x^2 - 4x$ 1) _____

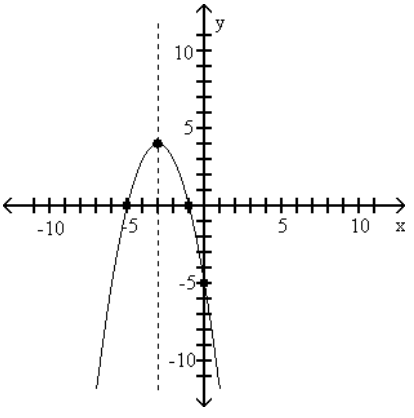
A) (-2, 4); x = -2 B) (2, -4); x = 2 C) (-4, 2); x = -4 D) (4, -2); x = 4

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

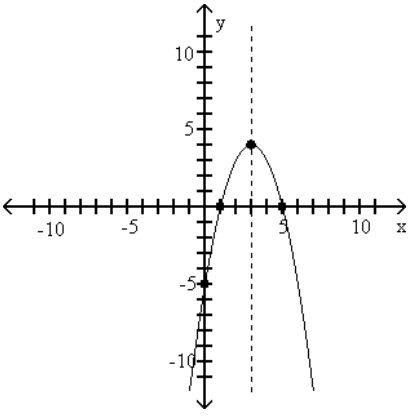
2) $f(x) = x^2 - 6x + 5$ 2) _____



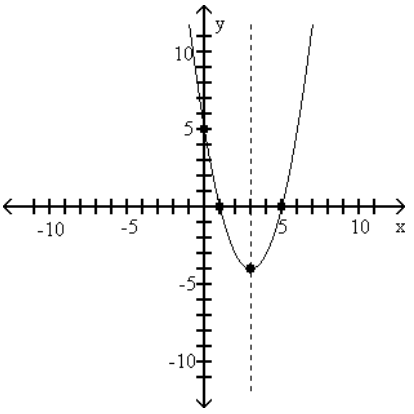
A) vertex (-3, 4)
intercepts (-5, 0), (- 1, 0), (0, -5)



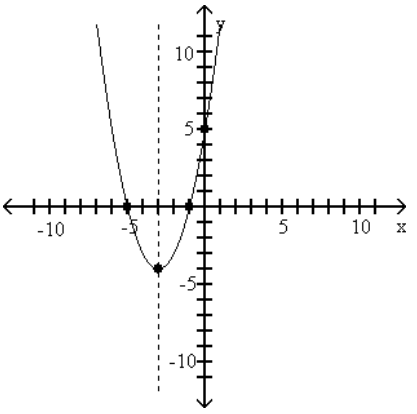
B) vertex (3, 4)
intercepts (5, 0), (1, 0), (0, -5)



C) vertex (3, -4)
intercepts (5, 0), (1, 0), (0, 5)

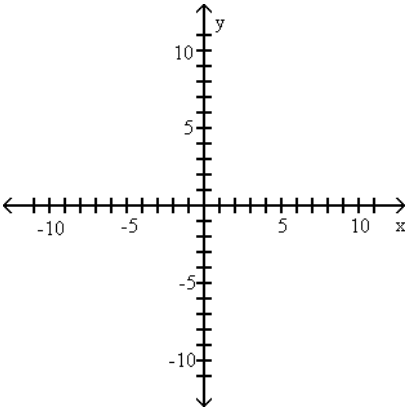


D) vertex (-3, -4)
intercepts (-5, 0), (- 1, 0), (0, 5)

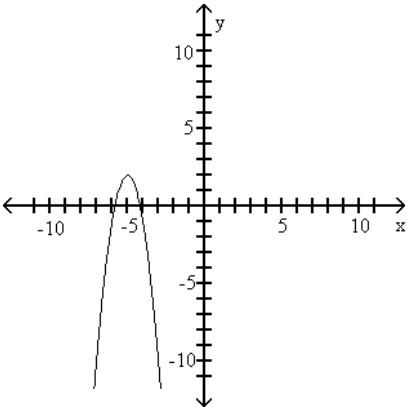


Graph the function f by starting with the graph of $y = x^2$ and using transformations (shifting, compressing, stretching, and/or reflection).

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



A)



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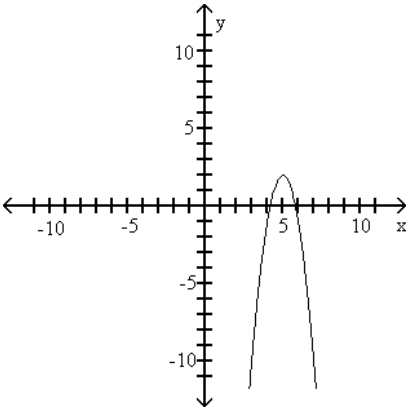
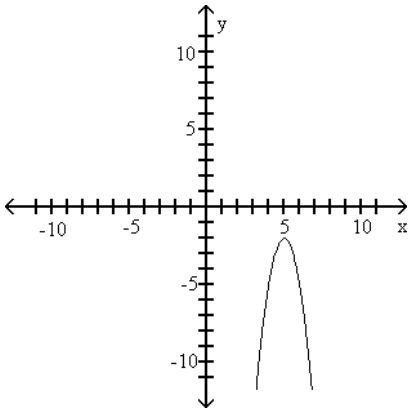
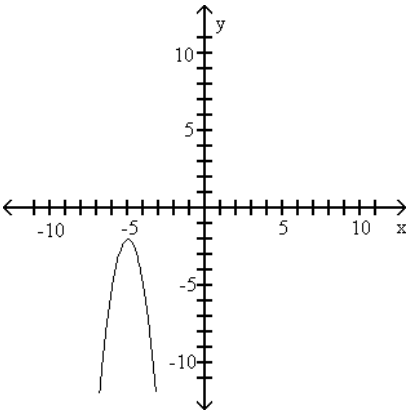


C)



D)



Form a polynomial whose zeros and degree are given.

4) Zeros: -3, -2, 2; degree 3 4) _____

A) $f(x) = x^3 - 3x^2 - 4x + 12$ for $a = 1$

B) $f(x) = x^3 - 3x^2 + 4x - 12$ for $a = 1$

C) $f(x) = x^3 + 3x^2 + 4x + 12$ for $a = 1$

D) $f(x) = x^3 + 3x^2 - 4x - 12$ for $a = 1$

Find the x- and y-intercepts of f.

5) $f(x) = (x + 1)(x - 6)(x - 1)^2$ 5) _____

A) x-intercepts: -1, 1, -6; y-intercept: -6

B) x-intercepts: -1, 1, -6; y-intercept: 6

C) x-intercepts: -1, 1, 6; y-intercept: -6

D) x-intercepts: -1, 1, 6; y-intercept: 6

Find the power function that the graph of f resembles for large values of |x|.

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

A) $y = x^4$ B) $y = x^3$ C) $y = x$ D) $y = x^2$

Find the domain of the rational function.

7) $f(x) = \dfrac{x + 8}{x^2 - 16}$ 7) _____

A) all real numbers

B) $\{x \mid x \neq -4, x \neq 4\}$

C) $\{x \mid x \neq 0, x \neq 16\}$

D) $\{x \mid x \neq -4, x \neq 4, x \neq -8\}$

Give the equation of the specified asymptote(s).

8) Vertical asymptote(s): $f(x) = \dfrac{3x + 10}{x^2 + 12x + 35}$ 8) _____

A) $x = -\dfrac{10}{3}, x = -7$ B) $x = 3$ C) $x = -\dfrac{10}{3}, x = 3$ D) $x = -7, x = -5$

9) Horizontal asymptote: $h(x) = \frac{8x^2 - 4x - 6}{5x^2 - 8x + 3}$ 9) _____

A) $y = \frac{1}{2}$ B) $y = \frac{8}{5}$

C) $y = 0$ D) no horizontal asymptotes

Find the indicated intercept(s) of the graph of the function.

10) x-intercepts of $f(x) = \frac{x^2 + 6x}{x^2 + 7x - 4}$ 10) _____

A) (6, 0) B) (0, 0) and (6, 0)

C) (0, 0) and (-6, 0) D) (-6, 0)

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

11) $f(x) = x^4 - 12x^2 - 64$; $x - 8$ 11) _____

A) Yes B) No

Solve the problem.

12) Use the Remainder Theorem to find the remainder when f(x) is divided by g(x). 12) _____
$f(x) = x^4 + 8x^3 + 12x^2$; $g(x) = x + 1$

A) 21 B) -5 C) 5 D) -21

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

13) $f(x) = 11x^4 - x^2 + 3$ 13) _____

A) $\pm\frac{1}{11}, \pm\frac{1}{3}, \pm 1, \pm 3, \pm 11$ B) $\pm\frac{1}{11}, \pm\frac{3}{11}, \pm 1, \pm 3$

C) $\pm\frac{1}{11}, \pm\frac{3}{11}, \pm 1, \pm 3, \pm 11$ D) $\pm\frac{1}{3}, \pm\frac{11}{3}, \pm 1, \pm 11$

Find all of the real zeros of the polynomial function, then use the real zeros to factor f over the real numbers.

14) $f(x) = x^4 + x^2 - 2$ 14) _____

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

C) -2, 2; $(x + 2)(x - 2)(x^2 + 1)$ D) -2, -1, 1; $(x + 1)(x - 1)(x + 2)$

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

15) Degree 3; zeros: 4, 2 - i 15) _____

A) -4 B) -2 + i C) 2 + i D) no other zeros

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

16) Degree: 3; zeros: 1 and 3 + i. 16) _____

A) $f(x) = x^3 - 7x^2 + 4x - 10$ B) $f(x) = x^3 - 7x^2 + 16x - 10$

C) $f(x) = x^3 + 7x^2 + 16x + 10$ D) $f(x) = x^3 - 5x^2 + 4x + 10$

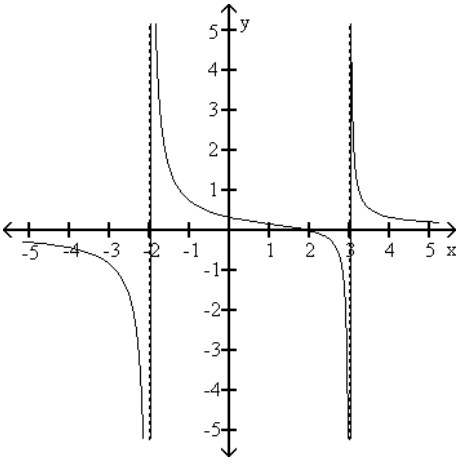
Determine, without graphing, whether the given quadratic function has a maximum value or a minimum value and then find that value.

17) $f(x) = x^2 - 4$ 17) _____

A) minimum; 0 B) maximum; 0 C) minimum; -4 D) maximum; -4

Solve the problem.

18) Decide which of the rational functions might have the given graph. 18) _____



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

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

For the polynomial, list each real zero and its multiplicity.

19) $f(x) = 4(x + 2)(x - 1)^4$ 19) _____

A) -2, multiplicity 1; 1, multiplicity 4 B) 2, multiplicity 1; -1, multiplicity 4

C) -2, multiplicity 2; 1, multiplicity 1 D) 2, multiplicity 1, -1, multiplicity 4

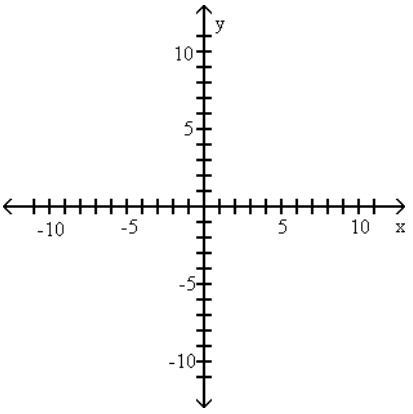
Solve the equation in the real number system.

20) $x^3 + 6x^2 + 11x + 6 = 0$ 20) _____

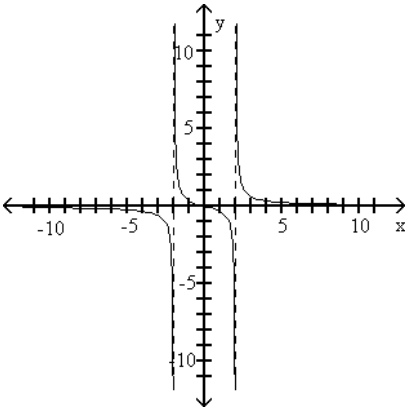
A) {1, 2, 3} B) {2, 3} C) {-3, -2, -1} D) {-3, -2}

Graph the function.

21) $f(x) = \dfrac{x}{x^2 - 4}$ 21) _____



A)



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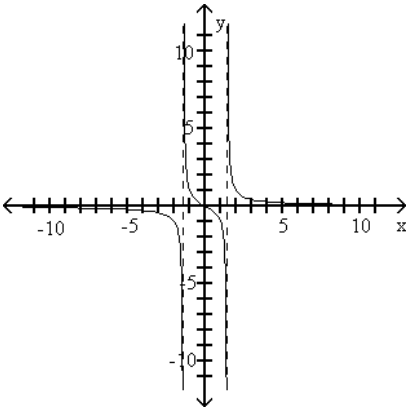

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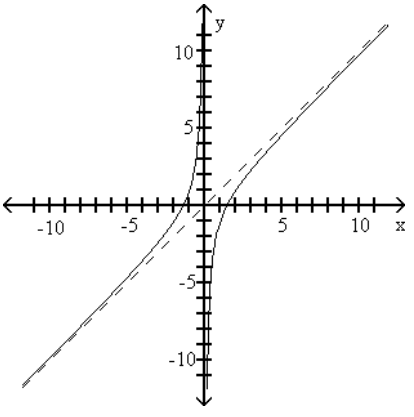

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