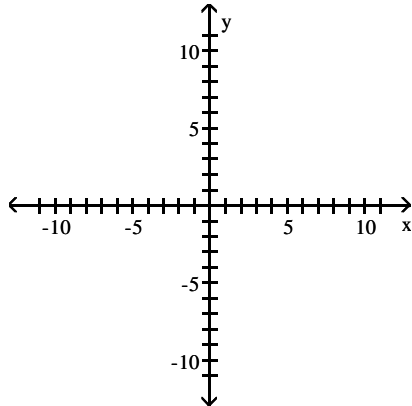


Graph the function  $f$  by starting with the graph of  $y = x^2$  and using transformations (shifting, compressing, stretching, and/or reflection).

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

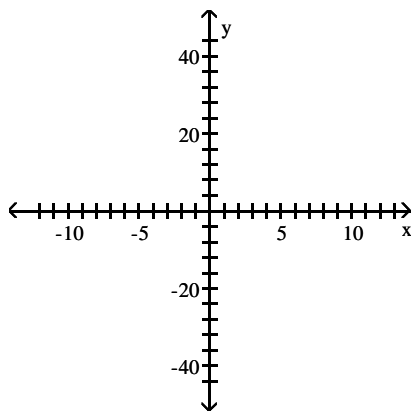


Find the vertex and axis of symmetry of the graph of the function.

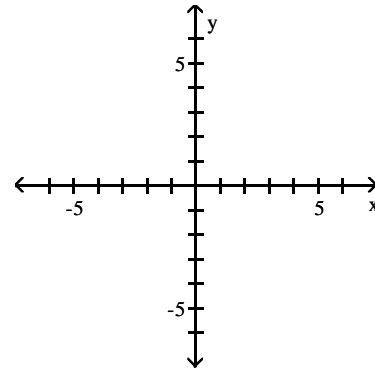
2)  $f(x) = -x^2 + 8x$

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

3)  $f(x) = x^2 - 12x + 36$



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



Determine the domain and the range of the function.

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

Determine where the function is increasing and where it is decreasing.

6)  $f(x) = -x^2 - 4x$

Solve the problem.

7) The manufacturer of a CD player has found that the revenue  $R$  (in dollars) is  $R(p) = -4p^2 + 1950p$ , when the unit price is  $p$  dollars. If the manufacturer sets the price  $p$  to maximize revenue, what is the maximum revenue to the nearest whole dollar?

8) Consider the quadratic model  $h(t) = -16t^2 + 40t + 50$  for the height (in feet),  $h$ , of an object  $t$  seconds after the object has been projected straight up into the air. Find the maximum height attained by the object. How much time does it take to fall back to the ground? Assume that it takes the same time for going up and coming down.

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

9)  $f(x) = 2x + 6x^5$

10)  $f(x) = \frac{3}{8} - \frac{1}{2}x$

11)  $f(x) = 8 - \frac{2}{x^6}$

12)  $f(x) = x^{4/3} - x^2 - 10$

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

13)  $f(x) = 4(x + 6)(x - 1)^4$

Find the x- and y-intercepts of f.

14)  $f(x) = (x + 9)^2$

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

15)  $f(x) = (x - 11)^4(x + 3)^5$

Determine the maximum number of turning points of f.

16)  $f(x) = 4x - x^3$

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

17)  $f(x) = (x - 4)^2(x + 5)^2$

Solve the problem.

- 18) Form a polynomial function P(x) with zeros: -3, multiplicity 2; 1, multiplicity 1; 5, multiplicity 3; and degree = 6.

Find the domain of the rational function.

19)  $h(x) = \frac{x + 9}{x^2 + 64x}$

Give the equation of the specified asymptote(s).

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

21) Horizontal asymptote:  $h(x) = \frac{7x^2 - 2x - 3}{5x^2 - 4x + 5}$

22) Horizontal asymptote:  $f(x) = \frac{x^4 - 1}{3x^5 + 3}$

23) Oblique asymptote:  $f(x) = \frac{x^2 - 4x + 6}{x + 3}$

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

24) x-intercepts of  $f(x) = \frac{(x - 7)(2x + 3)}{x^2 + 2x - 2}$

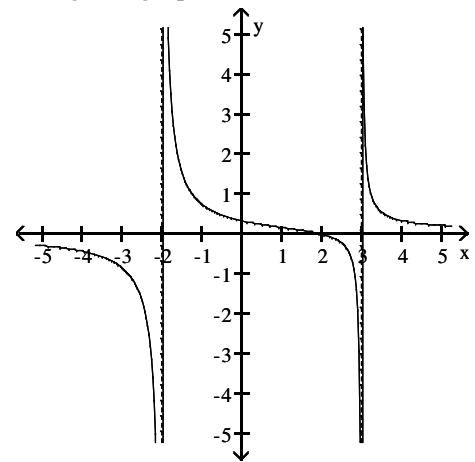
25) y-intercept of  $f(x) = \frac{x - 3}{x^2 + 12x - 9}$

Solve the problem.

- 26) Find the vertical asymptote(s) and/or hole(s)

for  $R(x) = \frac{x^2 + x - 56}{x^2 - x - 72}$ .

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



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

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

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

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

Solve the inequality.

28)  $(x - 5)(x - 7) > 0$

29)  $2x^2 - 7x > 9$

30)  $x^4 < 9x^2$

31)  $\frac{x - 5}{x + 7} < 0$

$$32) \frac{x-2}{x} + \frac{2}{x-1} \leq 2$$

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

$$33) f(x) = x^3 + 8x^2 - 18x + 20; \quad x + 10$$

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

$$34) f(x) = 5x^3 - x^2 + 2$$

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

$$35) f(x) = x^3 + 3x^2 - 4x - 12$$

Solve the equation in the real number system.

$$36) 3x^3 - x^2 - 9x + 3 = 0$$

Use the intermediate value theorem to determine whether the polynomial function has a zero in the given interval.

$$37) f(x) = 2x^3 - 10x^2 + 2x - 9; \quad [4, 5]$$

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

$$38) \text{Degree } 3; \text{ zeros: } 3, 2 - i$$

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

$$39) \text{Degree: } 3; \text{ zeros: } 1 \text{ and } 3 + i.$$

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

$$40) f(x) = x^4 - 5x^2 - 36; \text{ zero: } -2i$$

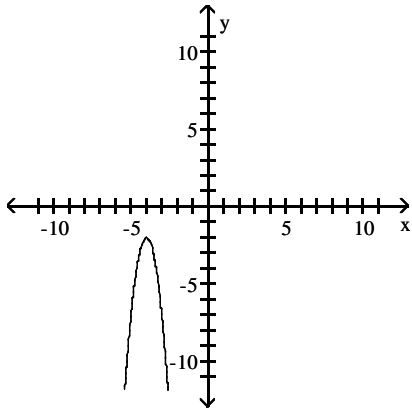
Find the complex zeros of the polynomial function.

$$41) f(x) = x^4 - 4x^3 - 44x^2 + 196x - 245$$

Answer Key

Testname: 1050 TEST 2 REVIEW FALL 2005

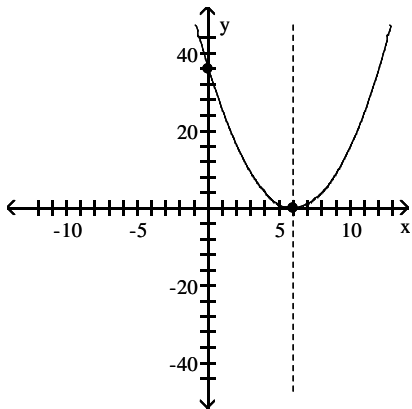
1)



2)  $(4, 16)$ ;  $x = 4$

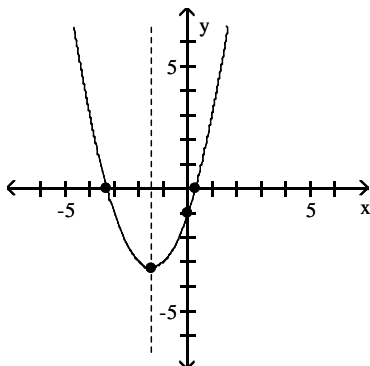
3) vertex  $(6, 0)$

intercepts  $(0, 36)$ ,  $(6, 0)$



4) vertex  $(-\frac{3}{2}, -\frac{13}{4})$

intercepts  $(0, -1)$ ,  $(\frac{-3 - \sqrt{13}}{2}, 0)$ ,  $(\frac{-3 + \sqrt{13}}{2}, 0)$



5) domain: all real numbers

range:  $\{y \mid y \geq -4\}$

6) increasing on  $(-\infty, -2)$

decreasing on  $(-2, \infty)$

7) \$237,656

8) maximum height = 75 ft; time to reach ground = 2.5 seconds

## Answer Key

Testname: 1050 TEST 2 REVIEW FALL 2005

- 9) Yes; degree 5  
10) Yes; degree 1  
11) No;  $x$  is raised to the negative 6 power  
12) No;  $x$  is raised to non-integer  $4/3$  power  
13)  $-6$ , multiplicity 1, crosses  $x$ -axis;  $1$ , multiplicity 4, touches  $x$ -axis  
14)  $x$ -intercept:  $-9$ ;  $y$ -intercept:  $81$   
15)  $y = x^9$   
16)  $2$   
17) above the  $x$ -axis:  $(-\infty, -5)$ ,  $(-5, 4)$ ,  $(4, \infty)$   
below the  $x$ -axis: no intervals  
18)  $P(x) = (x + 3)^2(x - 1)(x - 5)^3$   
19)  $\{x \mid x \neq 0, x \neq -64\}$   
20)  $x = -7, x = -5$   
21)  $y = \frac{7}{5}$   
22)  $y = 0$   
23)  $y = x - 7$   
24)  $(7, 0)$  and  $(-\frac{3}{2}, 0)$   
25)  $(0, \frac{1}{3})$   
26) vertical asymptote:  $x = 9$ ; hole at  $(-8, \frac{15}{17})$   
27) C  
28)  $(-\infty, 5)$  or  $(7, \infty)$   
29)  $(-\infty, -1)$  or  $(\frac{9}{2}, \infty)$   
30)  $(-3, 0)$  or  $(0, 3)$   
31)  $(-7, 5)$   
32)  $(-\infty, -1]$  or  $(0, 1)$  or  $[2, \infty)$   
33) Yes  
34)  $\pm \frac{1}{5}, \pm \frac{2}{5}, \pm 1, \pm 2$   
35)  $-3, -2, 2$ ;  $f(x) = (x + 3)(x + 2)(x - 2)$   
36)  $\{\frac{1}{3}, \sqrt{3}, -\sqrt{3}\}$   
37)  $f(4) = -33$  and  $f(5) = 1$ ; yes  
38)  $2 + i$   
39)  $f(x) = x^3 - 7x^2 + 16x - 10$   
40)  $2i, 3, -3$   
41)  $-7, 7, 2 - i, 2 + i$