Math 1314

Test 3 Review

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.
Find the domain and range of the function.

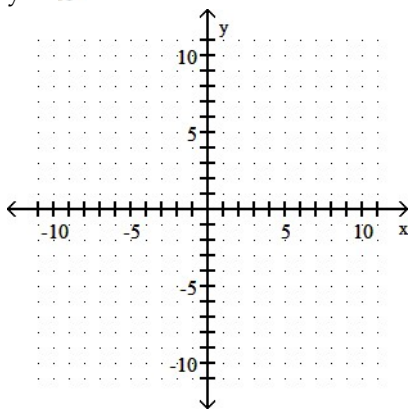
1) $y = (x - 9)^2 + 6$ 1) _____

Identify the vertex of the parabola.

2) $y = 3x^2 - 6x - 2$ 2) _____

Sketch the graph of the parabola.

3) $y = -x^2 + 2x - 6$ 3) _____



Use synthetic division to perform the division.

4) $\dfrac{x^3 - 1}{x - 1}$ 4) _____

Use synthetic division to divide f(x) by x - k for the given value of k. Then express f(x) in the form $f(x) = (x - k)q(x) + r$ for the given value of k.

5) $f(x) = -5x^4 + x^3 + 2x^2 + 3x - 1; \quad k = 1$ 5) _____

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

6) $k = 2; \quad f(x) = -x^3 - 2x^2 + 4$ 6) _____

Factor f(x) into linear factors given that k is a zero of f(x).

7) $f(x) = x^3 - 12x - 16; \quad k = -2$ (multiplicity 2) 7) _____

For the polynomial, one zero is given. Find all others.

8) $P(x) = x^4 - 21x^2 - 100; \quad -2i$ 8) _____

9) $P(x) = x^3 - 7x^2 + 15x - 25; \quad 5$ 9) _____

Give all possible rational zeros for the following polynomial.

10) $P(x) = -2x^4 + 5x^3 + 3x^2 + 18$ 10) _____

Find all rational zeros and factor f(x).

11) $f(x) = x^3 + 8x^2 - x - 8$ 11) _____

Find the zeros of the polynomial function and state the multiplicity of each.

12) $f(x) = 4(x + 8)^2(x - 8)^3$ 12) _____

Find a polynomial of degree 3 with real coefficients that satisfies the given conditions.

13) Zeros of 1, -2, 3 and P(2) = 8 13) _____

Find a polynomial of least degree with only real coefficients and having the given zeros.

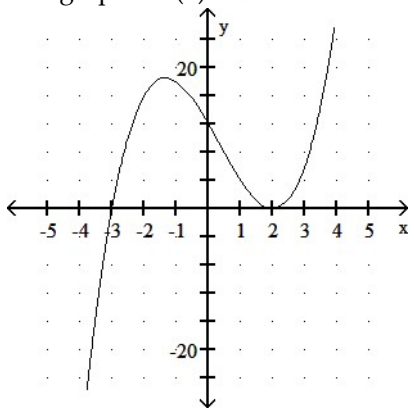
14) 2 + i, 4 14) _____

Use Descartes' Rule of Signs to determine the possible number of positive real zeros and the possible number of negative real zeros for the function.

15) $f(x) = 2x^3 - 8x^2 + 8x + 2$ 15) _____

Solve the problem.

16) The graph of $f(x) = x^3 - x^2 - 8x + 12$ is shown below. Use the graph to factor f(x). 16) _____



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
Determine which of the rational functions given below has the following feature(s).

17) x-intercepts: (3, 0) and (5, 0), y-intercept: (0, 15), vertical asymptote: x = 1, horizontal asymptote: y = 1 17) _____

A) $f(x) = \frac{(x + 3)(x + 5)}{(x + 1)}$

B) $f(x) = \frac{(x - 3)(x - 5)}{(x - 1)^2}$

C) $f(x) = \frac{(x - 3)(x - 5)}{(x - 1)}$

D) $f(x) = \frac{(x + 3)(x + 5)}{(x + 1)^2}$

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

18) How can the graph of $f(x) = \frac{1}{x - 6}$ be obtained from the graph of $y = \frac{1}{x}$? 18) _____

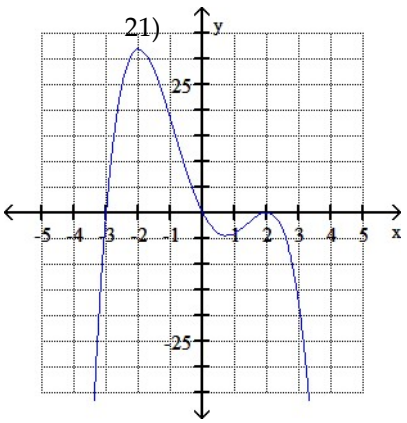
19) Solve the inequality. Write the solution set in interval notation. 19) _____

$4x^2 - 19x - 5 \geq 0$

20) Find the horizontal asymptote, if any, of the graph of the rational function. 20) _____

$g(x) = \frac{15x^2}{5x^2 + 1}$

21) Find the equation of the function whose graph is the following.

21) 

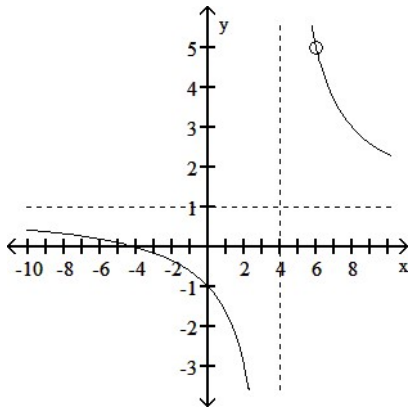
___
___
___
___
_

Give the equation of any oblique asymptotes.

22) $f(x) = \dfrac{x^2 + 6x - 4}{x - 2}$ 22) _____

Find an equation for the rational function graph.

23) 23) _____



Solve the rational inequality. Write the solution set in interval notation.

24) $\dfrac{x - 7}{x + 8} \leq 0$ 24) _____

Solve the quadratic inequality. Write the solution set in interval notation.

25) $x^2 + 7x \leq -12$ 25) _____

26) $(5 + 4x)^2 \geq -4$ 26) _____

Solve the rational inequality. Write the solution set in interval notation.

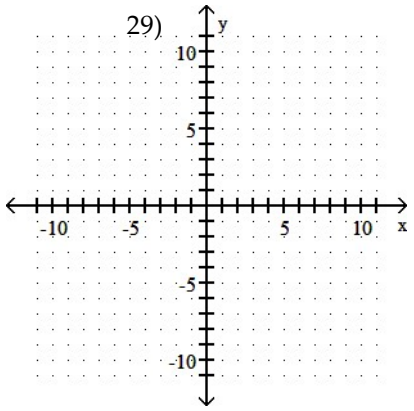
27) $\dfrac{x + 11}{x + 4} < 3$ 27) _____

Identify the vertex of the parabola.

28) $y = 4x^2 - 32x + 65$ 28) _____

Sketch the graph of the parabola.

29) $y = -\dfrac{3}{2}(x + 4)^2 - 3$

29) 

___
___
___
___
_

Provide an appropriate response.

30) Find a quadratic function f having x-intercepts 3 and -4 and y-intercept -24. 30) _____

Solve the problem.

31) x and y are two positive numbers and y is three greater than x. The product of the numbers is 130. Find the smaller number, x. 31) _____

Provide an appropriate response.

32) For what value of c does the quadratic function $f(x) = x^2 - 6x + c$ have exactly one x-intercept? 32) _____

Find a polynomial of least degree with only real coefficients and having the given zeros.

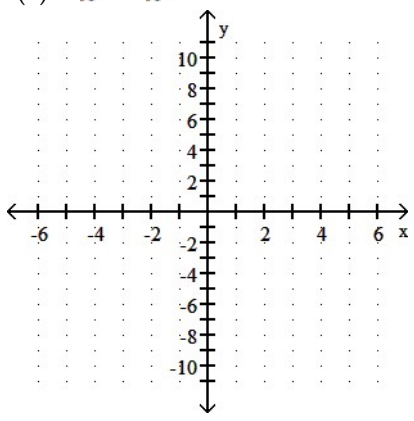
33) 2 + i, 2 33) _____

Find all complex zeros of the polynomial function. Give exact values. List multiple zeros as necessary.

34) $f(x) = x^3 - 7x^2 + 15x - 25$ 34) _____

Graph the polynomial function. Factor first if the expression is not in factored form.

35) $f(x) = x^3 + 5x^2 + 7x + 3$ 35) _____



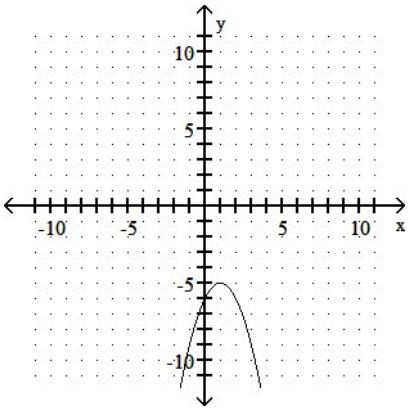
Find the zeros of the polynomial function and state the multiplicity of each.

36) $f(x) = (7x - 2)^4(x^2 + 16)^3$ 36) _____

1) Domain: $(-\infty, \infty)$; Range: $[6, \infty)$

2) (1, -5)

3)



4) $x^2 + x + 1$

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

6) -12

7) $f(x) = (x + 2)^2(x - 4)$

8) 2i, 5, -5

9) 1 + 2i, 1 - 2i

10) $\pm 1, \pm \frac{1}{2}, \pm 2, \pm 3, \pm \frac{3}{2}, \pm 6, \pm 9, \pm \frac{9}{2}, \pm 18$

11) 1, -1, -8; $f(x) = (x - 1)(x + 1)(x + 8)$

12) -8 (multiplicity 2), 8 (multiplicity 3)

13) $P(x) = -2x^3 + 4x^2 + 10x - 12$

14) $f(x) = x^3 - 8x^2 + 21x - 20$

15)

Positive	Negative	Nonreal Complex
2	1	0
0	1	2

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

17) B

18) By making a horizontal shift of 6 units to the right

19) $\left(-\infty, -\frac{1}{4}\right] \cup [5, \infty)$

20) $y = 3$

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

22) $y = x + 8$

23) $f(x) = \frac{(x + 4)(x - 6)}{(x - 4)(x - 6)}$

24) (-8, 7]

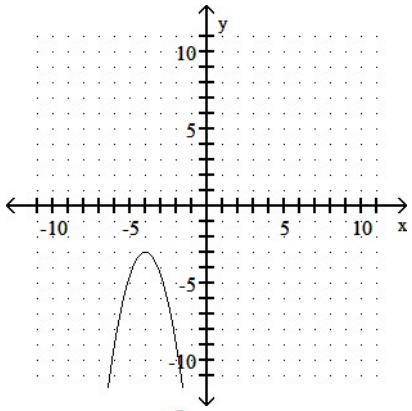
25) [-4, -3]

26) $(-\infty, \infty)$

27) $(-\infty, -4) \cup \left(-\frac{1}{2}, \infty\right)$

28) (4, 1)

29)



30) f(x) = $2x^2$ + 2x - 24

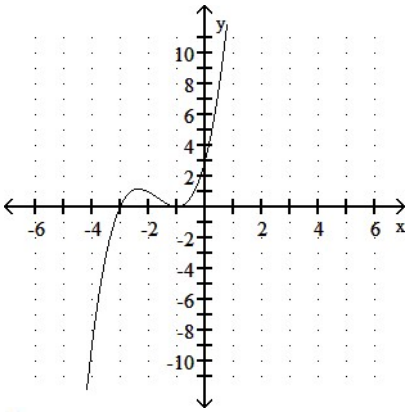
31) 10

32) 9

33) f(x) = x^3 - $6x^2$ + 13x - 10

34) 5, 1 + 2i, 1 - 2i

35)



36) $\frac{2}{7}$(multiplicity 4), ±4i (multiplicity 3)