1. Simplify each expression, and eliminate any negative exponent(s).

    a. $(5x^{-3}y^3)(7x^2)^2$

    b. $\dfrac{y^{-2}z^{-3}}{y^{-1}}$

    c. $\left(\dfrac{a^3b^{-2}}{b^3}\right)^2$

2. Simplify the expression. Assume that a and b denote any real numbers. (Assume that a denotes a positive number.)

    $$\sqrt[4]{80a^7b^4}$$

3. Find the sum, difference, or product. (Simplify your answer completely.)

    $$7(x^2 - 3x + 5) - 6(x^2 - 2x + 1)$$

4. Factor the difference of squares.

    $$49a^2 - 4$$

5. Factor the trinomial.

    $$7x^2 - 36x + 5$$

6. Factor the trinomial.

    $$x^2 + 10x - 39$$

7. Perform the multiplication or division and simplify.

    $$\frac{x^2+3x+2}{x^2+9x+20} \cdot \frac{x^2+7x+10}{x^2+4x+4}$$

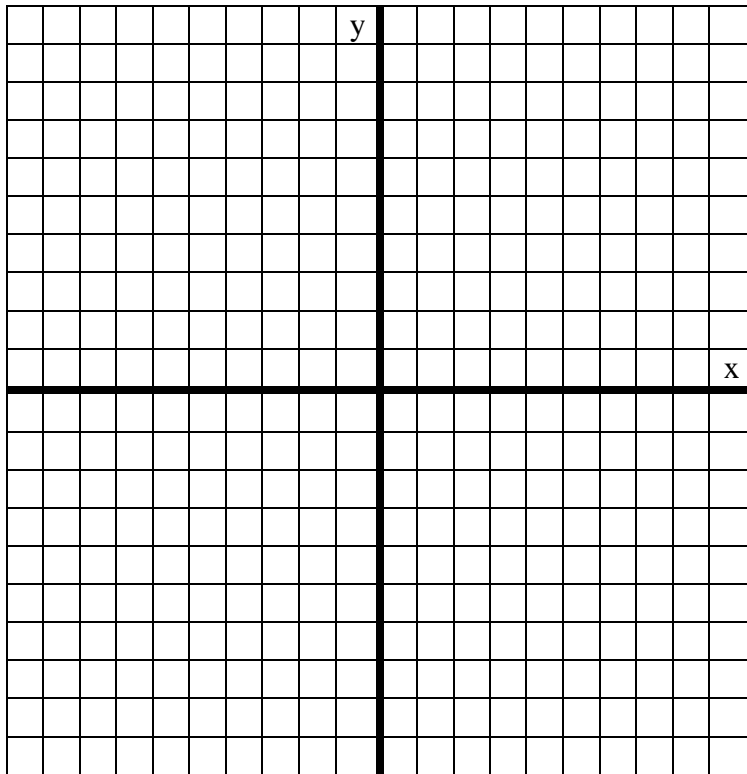8. Perform the addition or subtraction and simplify.

$$\frac{1}{x+6} + \frac{3}{x-1}$$

9. The given equation is either linear or equivalent to a linear equation. Solve the equation.

$$7(1 - x) = 8(1 + 2x) + 9$$

10. A pair of points is given. $(-7, 5), (5, 0)$

   a. Plot the points in a coordinate plane.

   b. Find the distance between them.

   c. Find the midpoint of the segment that joins them.

   $$(x, y) =$$

11. Find the x- and y-intercepts of the graph of the equation. (If answer does not exist, enter DNE.)

$$5x - 6y = 120$$

X-intercept

Y-intercept

12. Find the slope of the line through P and Q.

$$P(5, -5), Q(8, -1)$$

13. Find the equation of the line that satisfies the given conditions.

Through $(-1, -2)$ and $(6,5)$.

14. Find all real solution of the equation by factoring. (Enter your answer as a comma-separated list.)

$$x^2 - 10x + 24 = 0$$

x =

15. Find all real solutions of the equation. (Enter your answers as a comma-separated list. If there is no real solution, enter NO REAL SOLUTION.)

$$x^2 - 10x + 1 = 0$$

x =

16. Evaluate the product, and write the results in the form $a + bi$.

$$(9 - i)(7 + 5i)$$

17. Find all real solutions of the equation. (Enter your answers as a comma-separated list.)

$$x^3 = 25x$$

X =

18. Solve the linear inequality. Express the solution using interval notation.

$$2 - 3x > 3$$

Graph the solution set.

19. Solve the equation. (Enter your answers as a comma-separated list. If there is no solution, enter NO SOLUTION.)

$$3|x + 6| + 4 = 19$$

20. Hooke's Law states that the force needed to keep spring stretched x units beyond its natural length is directly proportional to x. Here the constant of proportionality is called the **spring constant**.

   a. Write Hooke's Law as an equation. (Use k for the constant of proportionality.)

   b. If the spring has a natural length of 6 cm and a force of 35 N is required to maintain the spring stretched to a length of 10 cm, find the spring constant.

   $$k =$$
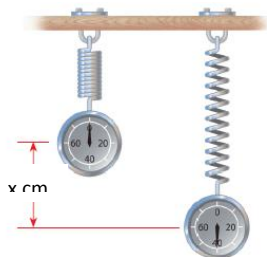
   c. What force is needed to keep the spring stretched to a length of 14 cm?

21. Find the domain of the function. (Enter your answer using interval notation.)

$$f(x) = \frac{x^4}{x^2+x-6}$$

22. Complete the table.

$g(x) = |8x + 7|$

x	$g(x)$
-3	
-2	
0	
1	
3	

23. The graph of a function is given. Use the graph to estimate the following.
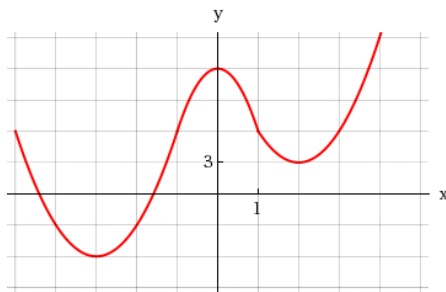
a. All the local maximum and minimum values of the function and the values of x at which each occurs

   Local Maximum: $(x, y) =$
   Local Minimum: $(x, y) =$
   Local Minimum: $(x, y) =$

b. The interval on which the function is increasing and on which the function is decreasing. (Enter your answer using interval notation.)

   Increasing:
   Decreasing:

24. A function f is given, and the indicated transformations are applied to its graph (in the given order). Write the equation for the final transformed graph.

$f(x) = x^2$; stretched vertically by a factor of 2, shift downward 8 units, and shift 9 units to the right.

$y =$

25. Use $f(x) = 4x - 5$ and $g(x) = 2 - x^2$ to evaluate the expression.

   a. $(f \circ g)(x)$

   b. $(g \circ f)(x)$

26. Find the function f whose graph is a parabola with the given vertex and that passes through the given point.

Vertex: $(3, -3)$;   point: $(4, 2)$

$f(x) =$

27. Find the quotient and remainder using long division.

$\dfrac{x^6 + 4x^4 - 3x^2 - 12}{x^2 + 4}$

Quotient:

Remainder

28. Find all the zeros of the polynomial. (Enter your answer as a comma-separated list. Enter all answers including repetitions.)

$P(x) = x^3 + 5x^2 + 4x + 20$

$x =$

29. Find the intercepts and asymptotes. (If an answer does not exist, enter DNA. Enter your asymptotes as a comma-separated list of equations if necessary.)
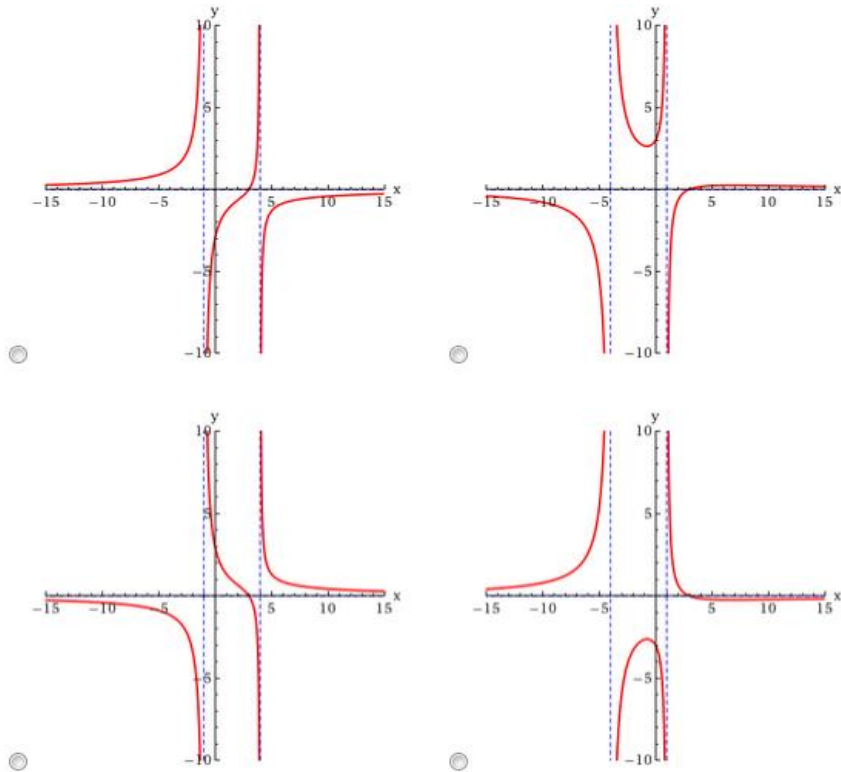
$$s(x) = \frac{(4x-12)}{(x-4)(x+1)}$$

X-intercept: $(x, y) =$
Y-intercept: $(x, y) =$

Vertical asymptote(s):
Horizontal asymptote:

Sketch the graph of the rational function.

State the domain and range. Use a graphing device to confirm your answer. (Enter your answer using interval notation.)

Domain:

Range:

30. Use the elimination method to find all solutions of the system of equations.

$$\begin{cases} 3x + 5y = 28 \\ 6x + y = 11 \end{cases}$$

$(x, y) =$