1. Find the equation of a line. Write your answer in slope-intercept form.
   (A) passes through (3, -4), (-7, 1)  (B) passes through (-3, 2), (8, 2)
   (C) passes through (-8, 5), slope undefined. (D) has x-intercept x=3, is perpendicular to the line 2x + 3y = 1

2. Find the slope and y-intercept of each line. Sketch the line. (A) y = 6-x  (B) y = 3x (C) y = -2x + 4

3. Evaluate f(-1), f(-3), f(2), where
   \[ f(x) = \begin{cases} 
   2x^2 - 1 & \text{if } x \leq -3 \\
   5 - 2x & \text{if } -3 < x \leq -1 \\
   4 & \text{if } x > -1 
   \end{cases} \]

4. Evaluate \( f(t+1) \) and simplify, where \( f(x) = x^2 + 1 \)

5. Find the domain of each function. Write your answer in interval form
   (A) \( f(x) = \sqrt{25 - x^2} \) (B) \( h(x) = \frac{\sqrt{x-1}}{x^2 - x - 6} \)

6. If the graph of the line \( y = mx + b \) is reflected in the y-axis, what will be the slope and intercepts of the new graph?

7. The relation of \( x \) and \( y \) is given. In each case, determine whether \( y \) is a function of \( x \).
   If \( y \) is a function of \( x \), does this function have an inverse?

\[ \begin{array}{c|cccc}
(A) & X & 2 & 3 & 5 & 6 \\
Y & 10 & 4 & 5 & 3 & 7 \\
\end{array} \]

8. \( f(x) = \frac{1}{x} \), \( g(x) = \frac{x-1}{x+1} \). Find (A) \( f \circ g \) (B) \( g \circ f \)
   Find the domain of \( f \), \( g \) and of each composite function.

9. Let \( f(x) = x^2 + 7 \), \( g(x) = \frac{1}{x-6} \), \( h(x) = \sqrt{6x} \). Find \( (g \circ f \circ h)(x) \)

10. Suppose \( f(x) = x^2 - 9 \), \( g(x) = \sqrt{9-x^2} \). Find (a) \( (g \circ f)(x) \) (b) \( (f \circ g)(0) \)
    Is it true that \( g = f^{-1} \)?

11. Verify that \( g = f^{-1} \). (A) \( f(x) = \frac{1}{2} x + 7 \) and \( g(x) = 2x - 14 \) (B) \( f(x) = \sqrt{x-8} \) and \( g(x) = x^2 + 8 \)

12. Find the inverse of \( f \) (A) \( f(x) = \frac{1}{2} x - 3 \) (B) \( f(x) = \sqrt{x+1} + 3 \) (C) \( f(x) = \frac{1-x}{2-x} \)

13. Determine if the function is odd, even, or neither. (A) \( f(x) = x^3 + 6 \) (B) \( f(x) = x^2 - 1 \) (C) \( g(x) = \sqrt{x} \) (D) \( f(x) = \frac{x^2 - 3}{x^3 + 2x} \)

14. The graph of \( y = g(t) \) contains the point (3, 4). What point must be on the following graph?
   (a) The graph of \( g(-t) \) must contain the point ______
   (b) The graph of \( -g(t) \) must contain the point ______
   (c) If \( g(t) \) is an even function, then graph of \( g(t) \) must also contain the point ______
   (d) If \( g(t) \) is an odd function, then graph of \( g(t) \) must also contain the point ______

15. For each of the following functions (a) identify the parent function \( f(x) \) (b) describe the transformations from \( f \) to \( h \)
   (c) Sketch the graph of \( h \) (d) Write \( h \) in terms of \( f \).
   (I) \( h(x) = -2 \sqrt{x-4} + 9 \) (II) \( h(x) = -|x+4| + 6 \)

16. Describe the graph each function and compare it to the graph of \( \varphi(x) = x^2 \). Express the function using \( \varphi \)
   (A) \( g(x) = 1 - 2x^2 \) (B) \( f(x) = (x-3)^2 \) (C) \( h(x) = (-x-3)^2 \)
17. Consider the function \( y = f(x) \) drawn below. Match the graph of \( y = -2f(-x) \) with the following graphs

18. Use the graphs of \( f(x) \) and \( g(x) \) to answer the following
(A) What is the value of \( f(-4) \)?
(B) For what values of \( x \) is \( f(x) = g(x) \)?
(C) Estimate the solution of the equation \( g(x) = 5 \)
(D) On what interval is the function \( f \) decreasing?

19. Suppose \( f(x) = 2(x + 3)^2 - 18 \). (A) Find the vertex of \( f \) (B) Find the minimum value of \( f \) (C) Find \( x \) and \( y \) intercepts

20. Find the vertex by completing the square
(A) \( f(x) = -x^2 - 8x + 12 \) (B) \( f(x) = x^2 + 5x - 4 \) (C) \( h(x) = 4x^2 + 4x + 13 \) (D) \( f(t) = 1 + 4t - 2t^2 \)

21. For each quadratic function in Problem 20, find the vertex by the formula.

22. Write the equation of the parabola.

23. The total revenue \( R \) earned (in $) from producing a gift box of candles is given by \( R(p) = -10p^2 + 800p \), where \( p \) is the price per unit (in $)
(A) Find the revenue when the price per box is $20, $30
(B) Find the unit price that will yield a maximum revenue. What is the maximum revenue?

24. Sketch the graphs of \( y(x) \) and of its transformation \( f(x) \). (identify the \( x \)-intercepts and \( y \)-intercepts)
(A) \( y = x^3 \), \( f(x) = -(x-4)^3 \) (B) \( y = x^4 \), \( f(x) = 2-x^4 \) (C) \( y = x^5 \), \( f(x) = (1/2)x^5 + 3 \)

25. Factor the following polynomials. Find all real zeros and determine the multiplicity of each zero.
(A) \( x^2 - 2x - 48 \) (B) \( 4x^2 - 15x - 4 \) (C) \( 2x^2 + 11x - 21 \) (D) \( x^3 - 4x^2 - 12x \) (E) \( x^4 - x^3 - 2x^2 \)

26. Use factoring to solve the equations
(A) \( x^2 - 3x^2 - 36x + 108 = 0 \) (B) \( 4x^4 + 12x^2 = 40x \)

27. Let \( f(x) = -0.3x(x+2)^2(x-3) \) (A) Match the function with the graph (B) Find the leading term

28. Let \( f(x) = 0.5x(x-2)^2(x+2) \). Identify the leading coefficient. Identify the zeros and their multiplicities. Plot test points. Sketch the graph.

29. Use long division to simplify the fraction \( \frac{6 - 4x^3}{2x + 1} \). Write the answer in the form \( q(x) + \frac{r(x)}{2x + 1} \)

2012