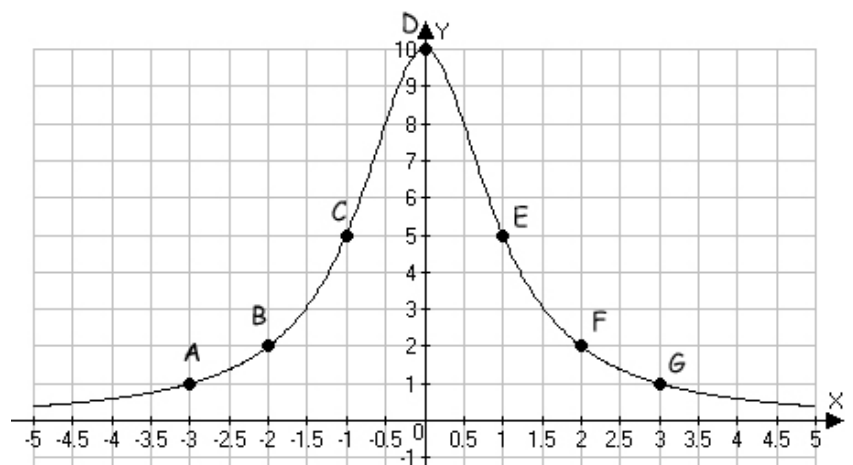# Math 5 – Trigonometry – fall '12 – Chapter 2 Test Review .

1. Consider the line passing the points (20,100) and (7,9) in the *x*-*y* Cartesian coordinate plane.
   a. Find an equation for the line in variables *x* and *y*.
   b. Find an equation for the line parallel to this line and passing through (0,8).
   c. Find an equation for the line perpendicular to this line and passing through (0,0).
   d. Find an equation for the parabola that goes through the points (0,0), (20,100) and (7,9)

2. Compute and simplify the average rate of change of $f(x) = 2x^2 + 8x$ over the given interval. Remember that the average rate of change on the interval [*a*, *b*] is the slope of the secant line connecting [*a*, *f*(*a*)] with [*b*, *f*(*b*)].
   a. [0, 3]
   b. [*a*, *a+h*]

3. Compute and simplify the average rate of change of $f(x) = \dfrac{x}{x^2 + 1}$ over the given interval.

   a. [0, 2]
   b. [1, 1+*h*]

4. Consider the quadratic $f(x) = -x^2 + 2x + 2$

   a. Express the quadratic function in vertex form: .
   b. Express the zeros (*x*-intercepts) of the parabola in simplest radical form.
   c. Sketch its graph, showing the coordinates of the vertex and all intercepts.

5. Suppose $f(x) = \sqrt{2-x}$ and $g(x) = \dfrac{1}{x^2-1}$.
   a. Find the domain of $(g \circ f)(x)$
   b. Find the domain of $(f \circ g)(x)$

6. Find the maximum value of the given function and state its range in interval notation.
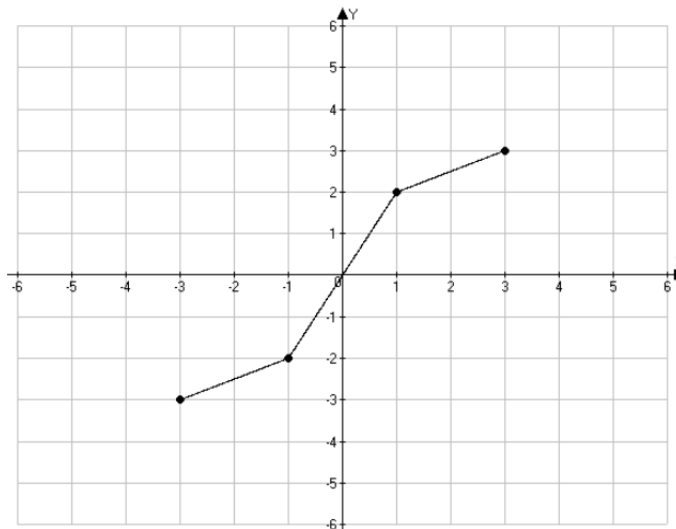   a. $f(x) = -2(x-3)^2 + 8$
   b. $f(x) = -2x^2 + 8x + 1$

7. Given the graph of $y = f(x)$ shown at right and the given transformation, tabulate the transformed coordinate values of points at A, B, C, D, E, F and G, and plot the given transformation
   a. $y = 2f(x)$
   b. $y = 1 + f(x-2)$
   c. $y = 10 - f(x)$

8. Consider the quadratic $f(x) = -3x^2 + 5x + 7$
   a. Express the quadratic function in vertex form.
   b. Sketch its graph.
   c. What sequence of transformations would transform this function to $y = x^2$?

9. Given the graph of $y = f(x)$ shown at right, graph
   a. $y = 2f(x)$
   b. $y = f\left(\dfrac{x}{2}\right)$
   c. $y = 2f(1-x)$
   d. $y = 2 - f(x+1)$

10. The total surface area of a cylinder is π square units.
    a. Find a function that models the cylinder's height as a function of its radius.
    b. Find a function that models the cylinder's radius as a function of its height.

11. Find a formula for the inverse function of $f(x) = \sqrt[3]{x+8}$ and plot the function and its inverse together in the same coordinate plane, showing the symmetry of these function across the line $y = x$.

12. Consider $f(x) = x^2$
    a. Write a formula for the function that results from shifting 2 units left, reflecting in the y-axis and then stretching horizontally by a factor 3, in that order.
    b. What sequence of transformations on $f(x)$ would produce $y = 2 - \left(\dfrac{x}{2} - 1\right)^2$?

13. Suppose $f(x) = \dfrac{2}{x^2 - 3x + 2}$ and $g(x) = \dfrac{1}{x-2}$.
    a. Find the domain of $(f \circ g)(x)$
    b. Find the domain of $(g \circ f)(x)$

14. Find a formula for the inverse function of $f(x) = (x+1)^3 - 3$ and sketch a graph for $f^{-1}(x)$ and $f(x)$ together showing the symmetry through the line $y = x$.

15. Find a formula for the inverse function of $f(x) = 3x - 2$ and sketch a graph for $f^{-1}(x)$ and $f(x)$ together showing the symmetry through the line $y = x$.