Math 5 – Trigonometry – fall '10 – Chapter 2 Test Review
The instructions will ask you to show all work for credit and write all responses on separate paper.

1. Consider the line passing the points (20,100) and (7,9) in the *x*-*y* Cartesian coordinate plane.
   a. Write a formula for the function that describes this line in slope-intercept form: $f(x) = mx + b$.
   b. Write a formula for the function for the line parallel to this line and passing through (0,8).
   c. Write a formula for the function of the line through (0,0) and perpendicular to this line.

2. Four lines intersect at the origin to create an asterisk with 8 congruent 45º angles. Write one possible list for the functions describing these four lines.

3. 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*]

4. Consider the function $f(x) = \dfrac{x}{x^2+1}$.
   a. Simplify an expression for the average rate of change of this function over the interval [0, 2]
   b. Simplify an expression for the average rate of change of this function over the interval [1, 1+*h*]
   c. Find an equation for the line normal to the curve at the point where *x* = 1.

5. Consider the quadratic $f(x) = 2x^2 - 3x + 1$
   a. Express the quadratic function in standard (vertex) form.
   b. Express the quadratic function in factored form and give the coordinates of the *x*-intercepts.
   c. Sketch its graph, showing the coordinates of the vertex and all intercepts.

6. Consider the quadratic $f(x) = -x^2 + 2x + 2$
   a. Express the quadratic function in standard (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.

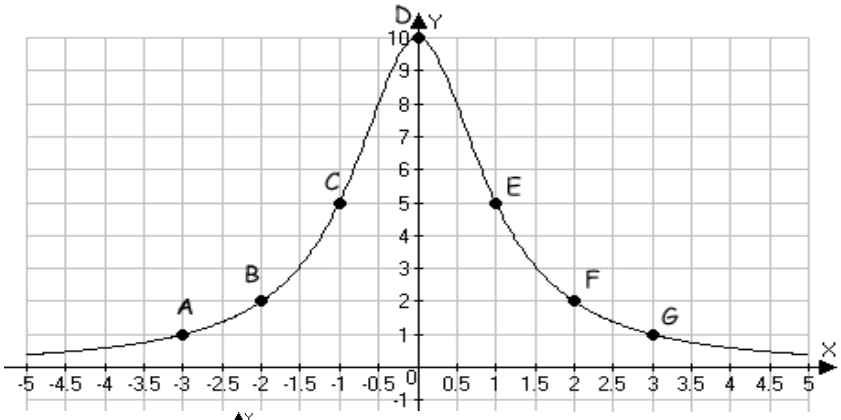
7. Suppose $f(x) = \dfrac{x}{x+2}$.
   a. Find the domain of $(f \circ f)(x)$ b. Find the domain of $(f \circ f \circ f)(x)$

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

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

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

11. 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

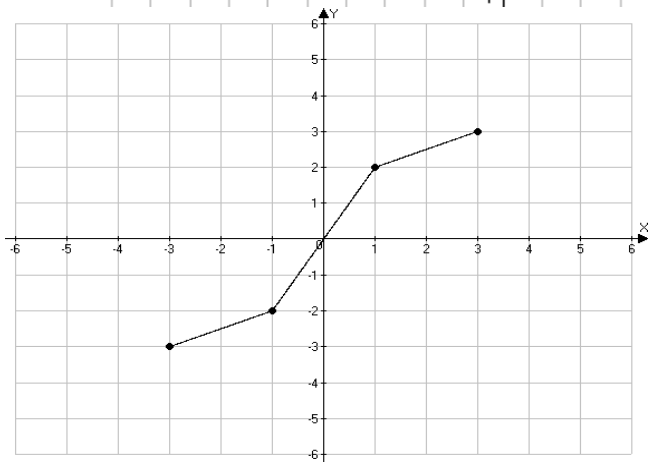


a. $y = 2f(x)$

b. $y = 1 + f(x-2)$

c. $y = 10 - f(x)$

12. Given the graph of $y = f(x)$ shown at right, graph



a. $y = 2f(x)$

b. $y = f\left(\frac{x}{2}\right)$

c. $y = 2f(1-x)$

d. $y = 2 - f(x+1)$

13. 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.

14. 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 $y = x$.

15. A mouse stands at point *A* on the bank of a straight canal, 20 feet wide. To reach point *B*, 70 feet down the canal on the opposite bank, it swims to a point *P* on the opposite bank and then runs the remaining distance to *B*. The mouse swims at 5 feet per minute and crawls at 10 feet per minute.

16. 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 transformations on *f*(*x*), in order, would produce this formula: $y = 2 - \left(\frac{x}{2} - 1\right)^2$

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

18. 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 $y = x$.