HW3: Due Tuesday, Sept. 9

Section 1.3

27) Questions on function composition.

    a) How is the graph of $y = f(|x|)$ related to the graph of f?

    b) Sketch the graph of $y = \sin|x|$.
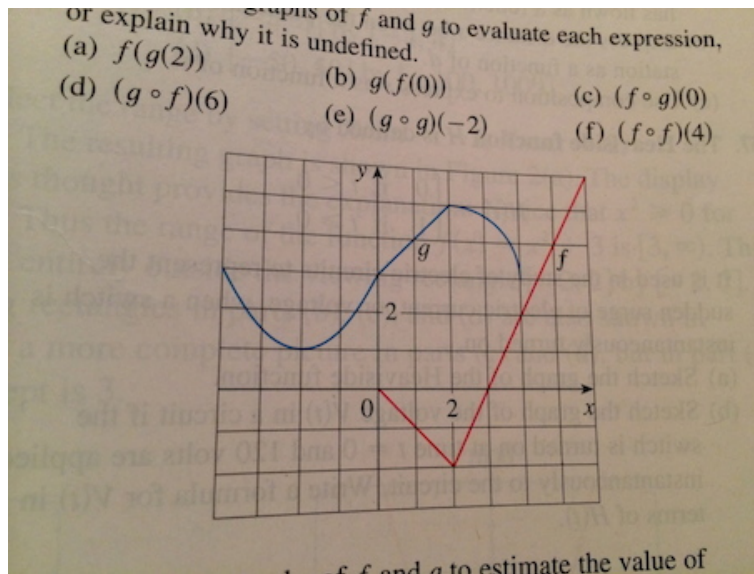
    c) Sketch the graph of $y = \sqrt{|x|}$.

35) Find the functions a) $f \circ g$, b) $g \circ f$, c) $f \circ f$, and d) $g \circ g$ and their domains, where $f(x) = x + 1/x$, $g(x) = (x+1)/(x+2)$.

37) Find $f \circ g \circ h$ where $f(x) = 3x - 2$, $g(x) = \sin(x)$, and $h(x) = x^2$.

47) Express $R(x) = \sqrt{\sqrt{x} - 1}$ in the form $f \circ g \circ h$.

51) Use the given graphs of f and g to evaluate each expression, or explain why it is undefined.

    a) $f(g(2))$ c) $(f \circ g)(0)$ e) $(g \circ g)(-2)$

    b) $g(f(0))$ d) $(g \circ f)(6)$ f) $(f \circ f)(4)$

55) A ship is moving at a speed of 30 km/h parallel to a straight shoreline. The ship is 6 km from shore and it passes a lighthouse at noon.

    a) Express the distance s between the lighthouse and the ship as a function of d, the distance the ship has traveled since noon; that is, find f so that $s = f(d)$.

    b) Express d as a function of t, the time elapsed since noon; that is, find g so that $d = g(t)$.

    c) Find $f \circ g$. What does this function represent?

60) If you invest x dollars at 4% interest compounded annually, then the amount $A(x)$ of the investment after one year is $A(x) = 1.04x$. Find $A \circ A$, $A \circ A \circ A$, and $A \circ A \circ A \circ A$. What do these compositions represent? Find a formula for the composition of n copies of A.

63) Suppose g is an even function and let $h = f \circ g$. Is h always an even function?

Section 1.5

3) Use the Law of Exponents to rewrite and simplify the following expressions:

    a) $b^8(2b)^4$

    b) $(6y^3)^4/(2y^5)$

8) Graph the given functions on a common screen. How are these graphs related?

    a) $y = e^x$

    b) $y = e^{-x}$

    c) $y = 8^x$

    d) $y = 8^{-x}$

15) Make a rough sketch of the graph of the function $y = 1 - \frac{1}{2}e^{-x}$. Do not use a calculator. Just use the graphs given in Figures 3 and 13 and, if necessary, the transformations of Section 1.3.

17) Starting with the graph of $y = e^x$, write the equation of the graph that results from

    a) shifting 2 units downward

    b) shifting 2 units to the right

    c) reflecting about the $x-$axis

    d) reflecting about the $y-$axis

    e) reflecting about the x-axis and then about the y-axis