Math 261 - Lab 1   **Algebra Review**   **Name:** _____

1. Evaluate each of the following.

    (a) $(-3)^2$ (b) -3^2 (c) $\sqrt[3]{-27}$

    (d) $\dfrac{\sqrt{50}}{\sqrt{2}}$

2. Find an equation for a line meeting each description.

    (a) The line that passed through the points $(4, -3)$ and $(2, 1)$.

    (b) The line with the same x-intercept as $x - 2y = 4$ and which is parallel to the line that passed through the points $(4, -2)$ and $(-3, 1)$.
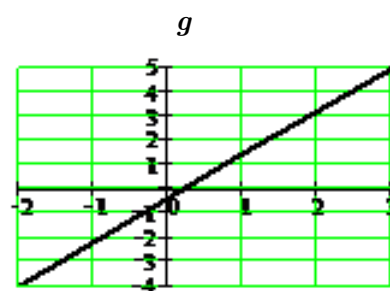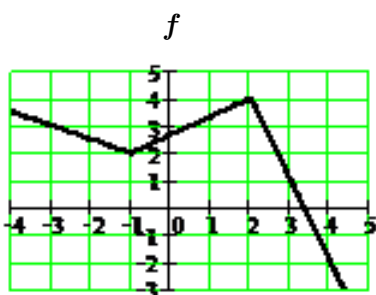
3. Given the graphs of functions f and g as defined below:

    (a) Find the equation of the segment that passes through $g(1)$.

    (b) Find the equation of the segment that passes through $f(1)$.

    (c) Approximate the domain and range for f and g.

    (d) Determine the exact value of $(f \circ g)(1)$.

f

g

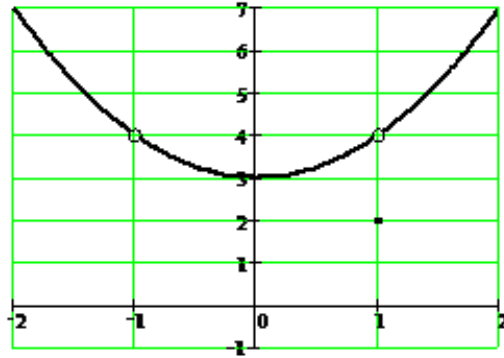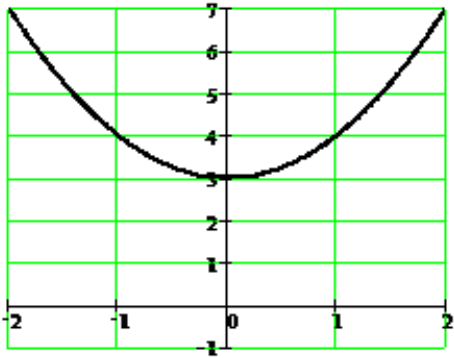4. For the functions f and g defined by the graphs below, compute each of the following(if possible).

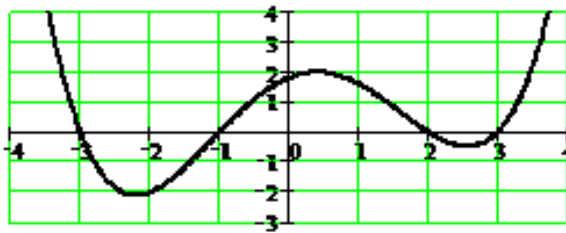$f(-1)$ $\qquad$ $f(0)$ $\qquad$ $f(1)$ $\qquad$ $g(-1)$ $\qquad$ $g(0)$ $\qquad$ $g(1)$

5. For the function f defined by the graph below: (*Assume only the visible graph.*)

(a) Determine the values when $f(x) < 0$.

(b) Approximate the value(s) of x when $f(x) = 1$.

(c) Approximate the domain and range of f.
(**Assume only the visible graph.**)

(d) Approximate the intervals where f is decreasing.
(**Assume only the visible graph.**)

6. Simplify each of the following. The answers must have no negative exponents and must be factored completely.

(a) $\dfrac{\frac{1}{t+h+1} - \frac{1}{t+1}}{h}$

(b) $\dfrac{\frac{2}{3}(x-1)^{-\frac{1}{3}}(x+2)^2 - 2(x-1)^{\frac{2}{3}}(x+2)}{[(x+2)^2]^2}$

7. The water level of a rectangular aquarium as a function of time is plotted on the following coordinate plane. When the faucet for filling the aquarium is on, the water level rises at a steady rate. Similarly, when the drain plug is pulled out, the water level falls at a steady rate (but slower than the faucet's rate). At various times some other events occur that affect the water level or the rate at which the water level changes. Identify the point in time when each of the following events **first** occurs.

(a) Pull the plug out when the faucet is off.

(b) Pull the plug out when the faucet is on.

(c) Put the plug in when the faucet is on.

(d) Dump a bucket of water into the aquarium.

(e) Turn the faucet off when the plug is in.

(f) Pull a large rock out of the aquarium.

(g) Put the plug in when the faucet is off.

(h) Turn the faucet on when the plug is in.

(i) Turn the faucet on when the plug is out.

(j) Turn the faucet off when the plug is out.

(k) Find the rate at which the water depth changes when the faucet is on and the plug is in.

(l) Find the rate at which the water depth changes when the faucet is off and the plug is out.

(m) What is the depth of the water at the end of 3 minutes? 11 minutes? and 17 minutes?

(n) Write an equation for the line segment over the time interval from 16 to 19 minutes.

Water Level in Inches

$z(t)$

Time in Minutes