Name:

HW 10: §4.5-5.4

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may use a calculator.

1. Suppose a population of bacteria starts at 15 bacteria in a petri dish and that the population doubles every forty minutes.

   (a) Write a function that gives population in terms of time in hours since the start of the experiment.

   (b) What is the population after 8 hours?

   (c) How long does it take for the population to reach 1 million?

2. Solve for x.

   $\log(2x + 1) + \log 2 = 2$

3. Let $f(x) = 2x + 4$, $g(x) = e^x$, and $h(x) = -4x^3 + 3$

   (a) Find $f \circ g(x)$

   (b) Find $g \circ h(x)$

   (c) Find $f^{-1}(x)$

4. Let $f(x) = x^2$. Write functions that represent the following geometric transformations.

   (a) Shift up by 2.

   (b) Shift to the left by 6.

   (c) Stretch vertically by a factor of 2.

   (d) Flip vertically and shrink by a factor of 2.

5. Write the following quadratic functions in standard form.

   (a) $x^2 + 4x - 3$

   (b) $x^2 - 6x + 14$

6. Write the following quadratic functions in general form.

   (a) $(x - 4)^2 + 6$

   (b) $(x + 2)^2 - 3$

7. Let $f(x) = x^2 - 3x + 4$

   (a) Express $f(x)$ in standard form.

   (b) Does f have a maximum or a minimum?

   (c) How many solutions does $f(x)$ have?

   (d) Sketch a graph of $f(x)$, being sure to label both the vertex and the y-intercept.

Optional Problems

4.5: All	4.6: 1-77	5.1: 1-18, 25-64
5.2: All	5.3: All	5.4: All