Objectives Assessed by MA 153 Test 3 Spring 2015
Section 5.2, 5.3, 2.4, 6.1, 6.2, 3.1, 3.2, 10.1, 11.1, 11.2, and 11.3

Section **5.2**

1. Given an initial amount and a growth rate over some period of time,
   a. write a formula for an exponential function.
   b. determine half-life or doubling or tripling time.
   c. determine the growth rate per period of time.
2. a. Recognize linear vs. exponential growth
   b. Find formulas for linear functions and exponential functions if given its initial value and on how it grows.
   c. Solve an equation involving an exponential function and a linear function.

Section **5.3**

3. Solve a logarithmic equation (and use $pH = -\log[H^+]$) .
4. Understand general shape, concavity, domain, range, asymptotes, etc. of the graph of $y = \log x$ or $y = \ln x$.

Section **2.4** & **6.1**

5. Understand vertical and horizontal shifts of a function as an outside/inside *additive* change to the function rule.
6. Understand vertical or horizontal reflections of a function as an outside/inside change to the function rule ***by a negative sign.*** Be able to combine these with shift transformations.
7. Identify whether a function is odd, even, or neither by looking at its graph, equation or table.
8. If given that a function is odd or even and a point on its graph, determine another point.

Section **6.2**

9. Understand vertical stretch or compression of a function as an outside *multiplicative* change to the function rule. Be able to combine these with reflections and shift transformations.

Section **3.1** and **3.2**

10. Understand the expanded form, vertex form, and factored form of a parabola. Convert from expanded form to vertex form by completing the square or using a grapher and a shift transformation. Connect the meaning of the parameter a in each formula to the shape of the graph: a is the signed vertical distance of the graph after moving 1 unit left or right from the vertex.
11. Find the vertex, axis of symmetry, concavity, whether the graph is the same shape as $y = x^2$ or if it is vertically compressed or stretched, and intercepts if given its equation. Be able to sketch without a graphing calculator.
12. Find a quadratic model if given its zeros or its vertex and at least one other point.

Section **10.1**

13. Determine the composition $f(g(x))$. Simplify if necessary.

Section **11.1**

14. Know the six basic shapes of power functions and their equations. Know when they are flipped.
15. Find the formula for a power function $f(x) = kx^p$ if given that it passes through two points $(a, f(a))$ and $(b, f(b))$, where $a = 1$.
16. Find the formula for a power function $f(x) = kx^p$ if given that it passes through two points $(a, f(a))$ and $(b, f(b))$, where $a \neq 1$.

Section **11.2**

17. Identify the degree, leading term, leading coefficient, and long-run behavior of a polynomial if given in expanded or factored form.

Section **11.3**

18. Determine the zeros of a polynomial if given its equation in expanded or factored form.
19. Use the graph and the expanded form of a polynomial function to find its factored form.
20. Understand the (short-run) behavior of a polynomial function near its zeros.