Objectives Assessed by MA 153 Test 3
Chapter 4 (not 4.4) and Section 5.1-5.3, some of 5.5

1. Understand and use logarithms:
   a. Write a statement involving exponential form into logarithmic form and vice versa.
   b. Understand the inverse properties $e^{\ln W} = W$ and $\ln e^W = W$ or $10^{\log W} = W$ and $\log 10^W = W$

      Be able to write something like $\frac{1}{\sqrt{e^x}} = e^{-x/2}$ and then find $\ln\left(\frac{1}{\sqrt{e^x}}\right) = \ln e^{-x/2} = -\frac{x}{2}$
   c. Know how to evaluate a logarithm such as $\log_2 16$. (See worksheet on logs).
   d. Understand and use power property (Bob Barker property) and sum and difference properties of logs.
      4.1 – 1-10, 19-21, 23-30, 54 and **Chapter 4 Review** 27-29, 46 and worksheet on logarithms

2. Solve an exponential equation for exact solutions (and approximate solutions)
   a. with *x* on one side of the equation. See **4.1** 11-13, 40 and **Chapter 4 Review** – 7, 8
   b. with *x* on one side – multistep See **4.1** #14-18, 34, 37, 38, 41,43-45 **Ch 4 Review** 9, 10, 22**,** 41b, parts of 47

3. 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 **3.1** – 16, 26 and **3.2** – 1, 38 and **3.3** – 16, **Chapter 3 Review** –11
   d. predict a future value of *y* for some *x* and given a value of *y*, find a value of *x*.
      See **3.2**- 5, 15-17, 21-23, 26-29, 31, 33, 34 and **Chapter 3 Review** – 16, 17, 34-37, 43-45, 50
      See **4.2** – 9-16, 19-27, 34, 48 and **Chapter 4 Review** 13, 41

4. Solve a logarithmic equation (and use $pH = -\log[H^+]$) . See **4.1** 36 and **4.3** 13-17, 32, 34a and **Ch 4 Rvw** 47de

5. a. Recognize linear vs. exponential growth
   b. Find formulas for linear functions and exponential functions if given its initial value and information on how it grows.
   c. Solve an equation involving an exponential function and a linear function.
      Read page 118 **Exponential Growth Will Always Outpace Linear Growth in the Long Run** and read bottom of page 163 **Exponential Growth Problems That Cannot Be Solved By Logarithms** and do **3.2** --30 and **4.2** – 38, 39 and **Chapter 4 Review** 47gi

6. Understand general shape, concavity, domain, range, asymptotes, etc. of the graph of $y = \log x$ or $y = \ln x$. **4.3** – 1-6, 21

7. Understand vertical and horizontal shifts of a function as an outside/inside *additiv*e change to the function rule. Section **5.1** #2-25, 27-39, 41-45 and **Chapter 5 Review** #1-4, 17, 19, 26

8. 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. Section **5.2** #4-6, 8-19, 24, 25, 28, 29 and **Chapter 5 Review** #1-4, 27, 28

9. Identify whether a function is odd, even, or neither by looking at its graph, equation or table. Section **5.2** #1-3, 20-23, 32, 34, 35, 42 and **Chapter 5 Review** 5-10 and **Chapter 9 Review** 37abcdefg and 39

10. If given that a function is odd or even and a point on its graph, determine another point. **Section 5.2** #30 and 31

11. 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 5.3** #1-24, 28-38 and **Chapter 5 Review** #1-4, 18, 20, 23, 29, 37, 38

12. Understand the standard form, vertex form, and factored form of a parabola. Convert from standard form to vertex form by completing the square or using a grapher and a shift transformation. **Section 5.5** #15, 16, 25-27

Start Your Review by doing the following:
Check Your Understanding Chapter 3 (page 137): 1-20, 24-32
Check Your Understanding Chapter 4 (page 179): 1-22
Check Your Understanding Chapter 5 (page 237): 1-21, 24-29