Functions Chapter 5 Test Review

4/18/16

Section 5.1: Exponential Functions

1. Know what the graph of f(x) = ax for when a is both >0 and when 0<a<1
2. The function f(x) = Pakx is used for most exponential growth or decay questions
3. Inhibited population growth is depicted by an exponential equation that has either eto some coefficient or ato some coefficient on the bottom of a fraction (likely will not be on test but good to know just incase)

Problems for practice: Pages 377-379 #’s 1-13, 46, 48, 50

Section 5.2: Applications of Exponential Functions

1. Compound interest formula: A=P(1+r)t
   1. Know how to adjust that formula for compounded annually, quarterly, monthly, daily, etc.
2. Continuous compounding formula: A=Pert
   1. This will not be adjusted for different compound periods because it is continuously compounded
3. Radioactive decay is given by the formula M(x) = c(0.5x/h)
4. f(x) = Pax
   1. when a>1 it is exponential growth
   2. when 0<a<1 then exponential decay
   3. this function can have a coefficient “k” as described in section 5.1 above

Problems for practice: Pages 388-390 #’s 1-19, 20, 24, 26, 29, 30, 34, 45

Section 5.3: Common and Natural Logarithmic Functions

1. Definition of Common Logarithms: If c>0 then the common logarithm of c, denoted log c, is the solution of the equation 10x=c or in other words log c is the exponent to which 10 must be raised to produce c
2. Logarithmic and Exponential Equivalence: Let u and v be real numbers with v>0. Then log v = u exactly when 10u = v
3. Definition of Natural Logarithms: If c>0 then the natural logarithm of c, denoted ln c, is the solution of the equation ex=c or in other words ln c is the exponent to which e must be raised to produce c
4. Logarithmic and Exponential Equivalence: Let u and v be real numbers with v>0. Then ln v = u exactly when eu = v
5. **Properties of logarithms box on pg. 397**

Problems for practice: Pages 400-402 #’s 1-36

Section 5.4: Properties of Logarithms

1. Product law of logarithms: ln(vw)= ln v + ln w and log (vw) = log v + log w
2. Quotient law of logarithms: ln (v/w) = ln v – ln w and log (v/w) = log v – log w
3. Power law of logarithms: ln(vk) = k(ln v) and log (vk) = k(log v)

Problems for practice: Pages 408-409 #’s 1-24, 37

Section 5.4A: Logarithmic Functions to Other Bases

1. Definition of Logarithms to base b: if b and v are positive numbers, then the logarithm of v to base b, denoted logb v is the solution to the equation bx = v. In other words logb v = u exactly when bu = v.
2. Two boxes on page 413 that describe the properties of logarithms with base b and logarithm laws with base b
3. Change of base formula: for any positive numbers b and v, logb v = ln v / ln b

Problems for practice: Pages 417-418 #’s 1-36, 41-46, 51, 53, 57

Section 5.5: Algebraic Solutions of Exponential and Logarithmic Equations

1. If exponential equations have the same base we can set exponents equal to eachother
2. Read notes on how we solved these equations or refer to the examples on pages 422-425

Problems for practice: Pages 426-427 #’s 1-22, 25-42, 44, 48, 59

Section 5.7: Inverse Functions

1. The horizontal line test: if a function f is one-to-one then it has the following property. No horizontal line intersects the graph of f more than once.
2. Inverse functions definition: Let f be a one-to-one function. Then the **inverse function** of f is the function g whose rule is: g(y) = x exactly when f(x) = y. The domain of g is the range of f and the range of g is the domain of f.
   1. Remember if there is a limit on the range or domain of the original function than that is true for the opposite in g. If domain of f is all real numbers>0 than the range of g must be the same.
3. Finding inverse functions algebraically:
   1. Solve the equation f(x) = y for x.
   2. The solution is an expression in y, which is the rule of the inverse function g, that is, x = g(y)
   3. Rewrite the rule of x = g(y) as g(x) = y
4. **Round trip theorem: if you start with c and apply the original function and then the inverse you should have a final answer of c.** 
   1. g(f(x)) = x for every x in the domain of f
   2. f(g(x)) = x for every x in the domain of g
5. Inverse Function Graphs:
   1. if g is the inverse function of f, then the graph of g is the reflection of the graph of f over the line y=x
   2. If f is a one-to-one function and g is its inverse then (a,b) is on the graph of f exactly when (b,a) is on the graph of g
   3. f(a)=b then g(b)=a

Practice problems: Page 448 #’s 1-28, 35, 37, 39-44