H. Algebra II Semester II Review
Part 7 – Exponential and Logarithmic Functions

Instructor: M. Wolverton

7.a Exponential Function Properties

Find the Domain, Range, and any Asymptotes for each exponential function. Graph each function. Check your graphs with a calculator or graphing utility.

1. $f(x) = 3e^{x+4}$

2. $f(x) = 5 - 2^{x}$

3. $f(x) = 0.3^{x} - 2$

4. $f(x) = 3^{-x}$

Typically the domain of an exponential function will be unrestricted (all real numbers), while the range will be restricted. This is because you cannot use an exponent to make an input zero or turn a base negative.

7.b Solving Exponential Equations

Solve the following exponential equations.

1. $8 \cdot 10^{3x} = 12$

2. $e^{3x} = 12$

3. $e^{2x} - 5e^{x} + 6 = 0$

4. $6\left(2^{(3x-1)}\right) - 7 = 9$

Recall that the inverse of $b^{(x)}$ is $\log_b(x)$, so a logarithm reverses an exponential for solving. You will need to use logarithms in many cases where a variable appears in the exponent during solving.

7.c Logarithmic Function Properties

Find the Domain, Range, and any Asymptotes for each logarithmic function. Graph each function. Check your graphs with a calculator or graphing utility.

1. $f(x) = \log_2(x-3)$

2. $f(x) = 7 - \ln x$

Typically, the domain of a logarithmic function will be restricted while the range will be unrestricted (all real numbers). Recall that $\log_b(n)$ where $n \leq 0$ is undefined. Logarithms with zero or negative arguments are <u>undefined</u>. In other words, you cannot use an exponent to make an input zero or turn a base negative.

7.d Solving Logarithmic Equations

Solve the following logarithmic equations. Exclude extraneous solutions.

1. $3\ln(5x) = 10$

2. $\log(x-6) = \log(2x+1)$

3. $\ln(x) + \ln(x+3) = 1$

4. $\log_2(x+5) = \log_2(x-1) - \log_2(x+1)$

Recall that the inverse of $\log_b(x)$ is $b^{(x)}$, so exponentiation reverses a logarithm for solving. Extraneous solutions can occur because of the domain restrictions for logarithms (see 8.c).

Review the properties of logarithms (laws of logarithms).