Handout 2

MATH 140 Lab: Section 1

Lab Instructor (TA): Mohammed Kaabar

Student's Name:----------

Student's ID:----------

Note: *This handout contains the properties of both exponential and logarithmic functions*

Properties of Exponential Functions:

Assume that for any positive numbers: say a and b such that $a \neq 1$ and $b \neq 1$, and real numbers: say x and y. Then, we have the following list of exponential functions' properties:

- $a^x a^y = a^{x+y}$
- $(a^x)^y = a^{xy}$
- $(ab)^x = a^x b^x$
- $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$
- $\frac{a^x}{b^x} = a^{x-y}$
- $a^x = a^y \Leftrightarrow x = y$
- If $x \neq 0$, then $a^x = b^x \Leftrightarrow a = b$

Properties of Logarithmic Functions:

Assume that $a, b, U, and\ V$ are positive real numbers, $a \neq 1$, and x and n are real numbers. Then, we have the following list of logarithmic functions' properties:

- $\log_a 1 = 0$
- $\log_a a = 1$
- $\log_a a^x = x$
- $a^{\log_a x} = x, x > 0$
- $\log_a(UV) = \log_a U + \log_a V$
- $\log_a \left(\frac{U}{V}\right) = \log_a U - \log_a V$
- $\log_a U^n = n \log_a U$
- $\log_a U = \log_a V \Leftrightarrow U = V$
- $\log_a x = \frac{\log_b x}{\log_b a}$. This is known as the *Change of Base*.