# Presentation Logarithms and Inverse Functions

The goal of the presentation is to explain what what exponentials and logarithms are as well as their basic properties. In addition you should explain what the inverse of a function is. Your presentation should include

- A description of the $a^x$ where $a$ is a real number and $x$ is a rational number (i.e. $x = m/n$ where $m, n$ are natural numbers). One possible source is the entry on "Exponentiation" at www.wikipedia.com.

- A description of the logarithm function $(log_a(x))$. What is the relationship between $log_a(x)$ and $a^x$? Explain how the following laws can be used (for example find an equation involving logarithms where you use at least on of these laws to solve it).

    - $log_a(xy) = log_a(x) + log_a(y)$
    - $log_a(\frac{x}{y}) = log_a(x) - log_a(y)$
    - $log_a(x^r) = r * log_a(x)$

- What is the inverse of a function? Explain why all one-to-one functions have inverses and all non one-to-one functions don't.

- Show that if $f(x)$ is a function with an inverse $g(x)$ then $g(f(x)) = x$ and $f(g(x)) = x$ for all $x$ where they are defined.

- At LEAST one of

    - History of logarithms
    - How do we define $a^x$ if $x$ is an irrational number (i.e. how do we define $2^{\sqrt{2}}$)?

– What is the relationship between the laws of logarithms mentioned above and the laws of exponents

* $(a^x)(a^y) = (a)^{x+y}$

* $(a^x)/(a^y) = (a)^{x-y}$

* $(a^r)^s = a^{rs}$

– Explain why $(f \circ g)^{-1} = g^{-1} \circ f^{-1}$

You should also feel free to expand on the above in any directions you would like (so long as they are related to the topic).

If you have any questions regarding the presentation feel free to e-mail your TA or Dr. Ackerman.