Intro to Math for Political Scientists

Day 1 Homework

Fall 2015

1. Simplify the following expressions as much as possible.

    1. $9(3)^3$
    2. $(2a^2)(4a^4)$
    3. $\frac{x^4}{x^3}$
    4. $\left(\frac{1}{27b^3}\right)^{1/3}$
    5. $y^7y^5y^6y^4$

2. Simplify the following, making the answer free of any negative exponents.

$$(a^2b^{-1}c^{3/5})(a^{-3}b^{1/2}d^{1/4})$$

3. Solve for x in the following:

    1. $\sqrt[4]{625} = x$
    2. $\sqrt[x]{64} = 4$
    3. $log_{10}(1) = x$
    4. $log_{10}(x) = 3$
    5. $ln\left(\frac{1}{3^{3/2}}\right) = x$
    6. $ln(e) = x$
    7. $log_2(\frac{1}{8} = x$
    8. $log_x(64) = 3$
    9. $log_5(5^20) = x$
    10. $ln(e^82) = x$
    11. $e^{ln(3)} = x$

4. Take the logarithm of the following function and use the rules for logs to make it linear (additive instead of multiplicative).

$$y = x^2z^3w^4$$

5. $e^{1-x} = x$ Solve for x.

6. The concentration of alcohol in a person's blood is measurable. Suppose that the risk R (as a perccentage) of having an accident while driving a car can be modeled by the following equation:

$$R = 3e^{kx}$$

    where x is the concentration of alcohol in the blood and k is a constant.

    1. Suppose that a concentration of alcohol in the blood of 0.06 results in a 10 percent risk ($R = 10$) of an accident. Find the constant k in the equation.
    2. Using this value of k, what is the risk if the concentration is 0.17?
    3. Using the same value of k, what concentration of alcohol corresponds to a risk of 100 percent?
    4. If the law asserts that anyone with a risk of having an accident of 15 percent may not drive, at what concentraion of alcohol in the blood should a driver be arrested for DUI?