Week 0 - examples on logarithms
Sept. 10, 2015

Example 1.

Solve the following equations

a. $9^{x^2-3x+3/2} = 1/3$

$$9^{x^2-3x+3/2} = \frac{1}{3}$$

$$\log_9\left(9^{x^2-3x+3/2}\right) = \log_9\left(\frac{1}{3}\right)$$

$$x^2 - 3x + \frac{3}{2} = \frac{\log_3(1/3)}{\log_3 9}$$

$$x^2 - 3x + \frac{3}{2} = \frac{\log_3 1 - \log_3 3}{\log_3 3^2}$$

$$x^2 - 3x + \frac{3}{2} = \frac{0 - 1}{2}$$

$$x^2 - 3x + \frac{3}{2} + \frac{1}{2} = 0$$

$$x^2 - 3x + 2 = 0$$

$$(x - 2)(x - 1) = 0$$

$$x = 2, 1$$

b. $2^{\log_3(x+2)} = 5$

$$2^{\log_3(x+2)} = 5$$

$$\log_2 2^{\log_3(x+2)} = \log_2 5$$

$$\log_3(x + 2) = \log_2 5$$

$$3^{\log_3(x+2)} = 3^{\log_2 5}$$

$$x + 2 = 3^{\log_2 5}$$

$$x = 3^{\log_2 5} - 2$$

Example 2.

In the following equation, make y the subject: $\log_y 3 = x^2 - 2x$

$$\log_y 3 = x^2 - 2x$$
$$\frac{\log_3 3}{\log_3 y} = x^2 - 2x$$
$$\log_3 y = \frac{1}{x^2 - 2x}$$
$$y = 3^{1/(x^2 - 2x)}$$