

7.6 Solve Exponential and Logarithmic Equations

Property of Equality for Exponential Equations:

If b is a positive number other than 1,
then

$$b^x = b^y \text{ if and only if } x = y.$$



Example: Solve for x , $5^{x+1} = 5^{2x-7}$

$$x+1 = 2x-7$$

$$8 = x$$

Example: Solve for x , $3^x = 27^{x-1}$

$$3^x = (3^3)^{x-1}$$

$$3^x = 3^{3x-3}$$

$$x = 3x-3$$

$$-2x = -3$$

$$x = \frac{3}{2}$$

$$3^{\frac{3}{2}} = 27^{\frac{3}{2}-1}$$

Example: $100^{7x+1} = 1000^{3x-2}$

$$(10^2)^{7x+1} = (10^3)^{3x-2}$$

$$10^{2(7x+1)} = 10^{3(3x-2)}$$

$$14x+2 = 9x-6$$

$$5x = -8$$

$$x = -\frac{8}{5}$$

Example: $81^{3-x} = \left(\frac{1}{3}\right)^{5x-6}$

$$(3^4)^{3-x} = (3^{-1})^{5x-6}$$

$$4(3-x) = -1(5x-6)$$

$$12-4x = -5x+6$$

$$x = -6$$

Example: $2^x = 5$

$$\log_2 5 = x$$

$$\frac{\log 5}{\log 2}$$

$$2.322$$

Example: $7^{9x} = 15$

$$\log_7 15 = 9x$$

$$\frac{\log 15}{\log 7}$$

$$\frac{1.392}{9} = \frac{9x}{9}$$

$$x = .155$$

Example: $4e^{-0.3x} - 7 = 13$

$$4e^{-.3x} = 20$$

$$e^{-.3x} = 5$$

$$\ln 5 = -.3x$$

$$\frac{1.609}{-.3} = \frac{-.3x}{-.3}$$

$$x = -5.365$$

Calculator

~~A#31~~

Pg 519 3 – 19 odd

Pg 510 11, 13, 47, 48