

## 2.11 Exponential Equations

Solve the following exponential equations that CAN be written as the same base.

$$4^{x+2} = 2^{x+5}$$

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

$$2^{2x+4} = 2^{x+5}$$

Remove the base &  
Solve for x.

$$2x+4 = x+5$$

$$x+4 = 5$$

$$x=1$$

$$9^{2x-4} = 27^{x-1}$$

$$(3^2)^{2x-4} = (3^3)^{x-1}$$

$$4x-8 = 3x-3$$

$$x-8 = -3$$

$$x=5$$

$$2^{x^2} = 32(2^{4x})$$

$$2^{x^2} = 2^5 \cdot (2^{4x})$$

$$2^{x^2} = 2^{5+4x}$$

$$x^2 = 5 + 4x$$

$$x^2 - 4x - 5 = 0$$

$$\begin{array}{c} \boxed{5} \\ \boxed{-5} \\ \hline x-5 \end{array} \quad \begin{array}{c} -5 \\ \hline -5 \end{array} \quad \begin{array}{c} 1 \\ \hline 1 \end{array}$$

$$\left(\frac{1}{9}\right)^{x-2} = \left(\frac{1}{27}\right)^{x+1}$$

$$\left(9^{-1}\right)^{x-2} = \left(27^{-1}\right)^{x+1}$$

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

$$-2x + 4 = -3x - 3$$

$$x + 4 = -3$$

$$\checkmark x = -7$$

$$\rightarrow (x-5)(x+1)$$

$$x-5=0$$

$$\checkmark x=5$$

$$x+1=0$$

$$\checkmark x=-1$$

Solve the following exponential equations using logarithms.

$$3^{x+1} = 7^{2x}$$

$$(x+1) \cdot \log 3 = 2x \log 7$$

$$x \log 3 + \log 3 = 2x \log 7$$

$$\log 3 = 2x \log 7 - x \log 3$$

$$\log 3 = x \cdot (2 \log 7 - \log 3)$$

$$\frac{\log 3}{(2 \log 7 - \log 3)} = x$$

$$\underline{x \approx 0.39}$$

$$3(2)^{x-1} = 6^{2x}$$

$$\log 3 + (x-1)(\log 2) = 2x \log 6$$

$$\log 3 + x \log 2 - \log 2 = 2x \log 6$$

$$\log 3 - \log 2 = 2x \log 6 - x \log 2$$

$$\log 3 - \log 2 = x(2 \log 6 - \log 2)$$

$$\frac{(\log 3 - \log 2)}{(2 \log 6 - \log 2)} = x$$

$$\underline{x = 0.14}$$

$$4(5)^{2x} = 3^{x-1} \quad x = -1.17$$

Pg. 149  
1  
5-8 } odds.