

1. Solve the following equations involving exponentials or logarithms.

a.  $3 \log_2(x) = \log_2(18)$

$$\log_2(x^3) = \log_2(18)$$

$$x^3 = 18$$

$$x = \sqrt[3]{18}$$

The solution set  
is  $\{ \sqrt[3]{18} \}$ .

c.  $3 \cdot 5^x = 7$

$$5^x = \frac{7}{3}$$

$$\ln(5^x) = \ln\left(\frac{7}{3}\right)$$

$$x \ln(5) = \ln\left(\frac{7}{3}\right)$$

$$x = \frac{\ln\left(\frac{7}{3}\right)}{\ln(5)}$$

The solution set is  $\left\{ \frac{\ln\left(\frac{7}{3}\right)}{\ln(5)} \right\}$

b.  $\log(x+1) + \log(x-1) = \log(5x-7)$

$$\log(x^2-1) = \log(5x-7)$$

$$x^2-1 = 5x-7$$

$$x^2-5x+6=0$$

$$(x-3)(x-2)=0$$

$$x=2, 3 \quad (\text{both work})$$

The solution set  
is  $\{2, 3\}$

d.  $2^{2x+5} = 7^{x+5}$

$$\ln(2^{2x+5}) = \ln(7^{x+5})$$

$$(2x+5)\ln(2) = (x+5)\ln(7)$$

$$2\ln(2) \cdot x + 5\ln(2) = x \cdot \ln(7) + 5\ln(7)$$

$$2\ln(2) \cdot x - x \cdot \ln(7) = 5\ln(7) - 5\ln(2)$$

$$x(2\ln(2) - \ln(7)) = 5\ln(7) - 5\ln(2)$$

$$x = \frac{5\ln(7) - 5\ln(2)}{2\ln(2) - \ln(7)}$$

The solution set is  $\left\{ \frac{5\ln(7) - 5\ln(2)}{2\ln(2) - \ln(7)} \right\}$

Note  $\frac{\ln\left(\left(\frac{7}{2}\right)^5\right)}{\ln\left(\frac{4}{7}\right)}$  is also acceptable.

