

## Exponential Equations – unlike bases

1.  $7^x = 5$   $x \log 7 = \log 5 \Rightarrow x = 0.8270$
2.  $3^{x+1} = 8$   $(x+1) \log 3 = \log 8 \Rightarrow x = 0.8927$
3.  $11^{3x} = 5^x$   $3x \log 11 = x \log 5 \Rightarrow x = 0$
4.  $16^{x+1} = 26^{3x-5}$   $(x+1) \log 16 = (3x-5) \log 26 \Rightarrow x = 2.7226$
5.  $5^x = (4.6)^{4x+3}$   $x \log 5 = (4x+3) \log 4.6 \Rightarrow x = -1.0185$
6.  $216^x = 75(6^x)$   $x \log 216 = \log 75 + x \log 6 \Rightarrow x = 1.2048$
7.  $11^{x^2-4x} = 16$   $(x^2 - 4x) \log 11 = \log 16 \Rightarrow x = 4.2707$  and  $x = -0.2707$
8.  $1.04^x = 2$   $x \log 1.02 = \log 2 \Rightarrow x = 17.6729$
9.  $54.8^{-x} = 12.3^{x-2}$   $-x \log 54.8 = (x-2) \log 12.3 \Rightarrow x = 0.7706$
10.  $46^{4x-1} = 28(11^{3x})$   $(4x-1) \log 46 = \log 28 + 3x \log 11 \Rightarrow x = 0.8817$
11.  $100(1.05)^x = 125^{2x-1}$   $\log 100 + x \log 1.05 = (2x-1) \log 125 \Rightarrow x = 0.9818$
12.  $\frac{(1.03)^x - 1}{0.03} = 7$   $x \log 1.03 = \log 1.21 \Rightarrow x = 6.4488$
13.  $3^x = 18.4$   $x \log 3 = \log 18.4 \Rightarrow x = 2.6509$
14.  $12.4^x = 127$   $x \log 12.4 = \log 127 \Rightarrow x = 1.9240$
15.  $(13.5)^{2-5x} = (1.07)^{4x+3}$   $(2-5x) \log 13.5 = (4x+3) \log 1.07 \Rightarrow x = 0.3765$
16.  $(26)^{x^2+2x} = 703$   $(x^2 + 2x) \log 26 = \log 703 \Rightarrow x = 0.7355$  and  $x = -2.7355$
17.  $\frac{(1.04)^x - 1}{0.04} = 10$   $x \log(1.04) = \log 1.4 \Rightarrow x = 8.578942338$

$$17. \sqrt{5^{3x}} = 3 \cdot \sqrt[3]{2^x}$$

$$\frac{3x}{2} \log 5 = \log 3 + \frac{x}{3} \log 2 \Rightarrow x = 0.5032$$

$$18. \frac{6^{3x+1}}{5^x} = 342$$

$$(3x+1) \log 6 - x \log 5 = \log 342 \Rightarrow x = 1.0736$$

$$19. \frac{5^{3x+1}}{11} = \frac{3^{2x+5}}{13^x}$$

$$(3x+1) \log 5 - \log 11 = (2x+5) \log 3 - x \log 13 \Rightarrow x = 1.2089$$

$$20. \sqrt[3]{2^{x+1}} \cdot \sqrt{5^x} = \sqrt[4]{7^{3x-2}}$$

$$\left(\frac{x+1}{3}\right) \log 2 + \left(\frac{x}{2}\right) \log 5 = \left(\frac{3x-2}{4}\right) \log 7 \Rightarrow x = 2.8418$$