

Solve each of the following equations for  $x$ . Be very careful when taking roots as there may be more than one possibility. No logarithms necessary as the variable is not in the exponent. Use all your equation solving skills. Be creative!

1. 
$$\frac{4x^{\frac{2}{3}} - 5 = 11}{+5 \quad +5}$$

$$\frac{4x^{\frac{2}{3}}}{4} = \frac{16}{4}$$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = \left(4\right)^{\frac{3}{2}}$$

$$x = \left(\sqrt{4}\right)^3$$

$$x = (\pm 2)^3$$

$$x = \pm 8$$

2. 
$$x^{\frac{4}{3}} - 16 = 0$$

$$\left(x^{\frac{4}{3}}\right)^{\frac{3}{4}} = \left(16\right)^{\frac{3}{4}}$$

$$x = \left(\sqrt[4]{16}\right)^3$$

$$x = (\pm 2)^3$$

$$x = \pm 8$$

3. 
$$3x^{\frac{5}{3}} + 96 = 0$$

$$3x^{\frac{5}{3}} = -96$$

$$\left(x^{\frac{5}{3}}\right)^{\frac{3}{5}} = \left(-32\right)^{\frac{3}{5}}$$

$$x = \left(\sqrt[5]{-32}\right)^3$$

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

$$x = -8$$

$$4. \quad ((x-7)^4)^{\frac{1}{4}} = (16)^{\frac{1}{4}}$$

$$x-7 = \pm \sqrt[4]{16}$$

$$x-7 = \pm 2$$

$$x = 7 \pm 2$$

$$x = 9 \text{ or } 5$$

$$5. \quad \left( (x-3)^{\frac{2}{5}} \right)^5 = \left( (4x)^{\frac{1}{5}} \right)^5$$

$$(x-3)^2 = 4x$$

$$\begin{array}{r} x^2 - 6x + 9 = 4x \\ -4x \qquad \qquad -4x \\ \hline x^2 - 10x + 9 = 0 \end{array}$$

$$x^2 - 10x + 9 = 0$$

$$(x-9)(x-1) = 0 \quad x = 9 \text{ or } 1$$

$$6. \quad x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 8 = 0$$

$$(x^{\frac{1}{3}} - 4)(x^{\frac{1}{3}} + 2) = 0$$

$$x^{\frac{1}{3}} - 4 = 0$$

$$(x^{\frac{1}{3}})^3 = (4)^3$$

$$x = 64$$

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

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

$$\text{OR } x = -8$$