

1. Solve $x^3 - 4x^2 - x + 4 = 0$

$$(x^3 - 4x^2) + (-x + 4) = 0$$

$$x^2(x-4) - 1(x-4) = 0$$

$$(x-4)(x^2-1) = 0$$

$$(x-4)(x+1)(x-1) = 0$$

$$x-4=0 \text{ or } x+1=0 \text{ or } x-1=0$$

$$+4 \quad +4$$

$$-1 \quad -1$$

$$+1 \quad +1$$

$$\boxed{x=4}$$

$$\boxed{x=-1}$$

$$\boxed{x=1}$$

2. Solve $\sqrt{x+4} + \sqrt{x-1} = 5$

$$-\sqrt{x-1} \quad -\sqrt{x-1}$$

$$(\sqrt{x+4})^2 = (5 - \sqrt{x-1})^2$$

$$x+4 = (5 - \sqrt{x-1})(5 - \sqrt{x-1})$$

$$x+4 = 25 - 10\sqrt{x-1} + x-1$$

$$x+4 = -10\sqrt{x-1} + x+24$$

$$\frac{-20}{-10} = \frac{-10\sqrt{x-1}}{-10}$$

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

$$4 = x-1$$

$$+1 \quad +1$$

$$\boxed{5=x}$$

check $\sqrt{5+4} + \sqrt{5-1} = 5$

$$\sqrt{9} + \sqrt{4} = 5$$

$$3 + 2 = 5$$

$$5 = 5 \checkmark$$

3. Solve $5x^{3/2} - 10 = 0$

$$+10 \quad +10$$

$$\frac{5x^{3/2}}{5} = \frac{10}{5}$$

$$x^{3/2} = 2$$

$$(x^{3/2})^{2/3} = 2^{2/3}$$

$$\boxed{x = 2^{2/3}}$$

check: $5(2^{2/3})^{3/2} - 10 = 0$

$$5(2) - 10 = 0$$

$$10 - 10 = 0$$

$$0 = 0 \checkmark$$

4. Solve $x^{3/2} - 7x^{3/4} - 8 = 0$ $2 \frac{3}{4} \times \frac{2}{1} = \frac{3}{2}$

$$(x^{3/4})^2 - 7(x^{3/4}) - 8 = 0$$

let $u = x^{3/4}$

$$u^2 - 7u - 8 = 0$$

$$(u-8)(u+1) = 0$$

$$u-8=0 \quad \text{or} \quad u+1=0$$

$$u=8$$

$$(x^{3/4})^{4/3} = (8)^{4/3}$$

$$x = (2^3)^{4/3}$$

$$\boxed{x=16}$$

$$u=-1$$

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

$$x = (-1)^4$$

$$\cancel{x=1}$$

check $x=16$

$$16^{3/2} - 7(16)^{3/4} - 8 = 0$$

$$64 - 56 - 8 = 0$$

$$0 = 0 \checkmark$$

$x=1$

$$1^{3/2} - 7(1)^{3/4} - 8 = 0$$

$$-14 \neq 0$$

5. Solve $|\frac{2}{3}x - 6| - 2 = 0$

$$|\frac{2}{3}x - 6| = 2$$

$$\frac{2}{3}x - 6 = 2$$

$$\frac{2}{3}x = 8$$

$$\frac{2}{2} \cdot \frac{2}{3}x = 8 \cdot \frac{3}{2}$$

$$\boxed{x=12}$$

OR

$$\frac{2}{3}x - 6 = -2$$

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

$$\frac{2}{2} \cdot \frac{2}{3}x = 4 \cdot \frac{3}{2}$$

$$\boxed{x=6}$$

check

$$|\frac{2}{3}(12) - 6| - 2 = 0$$

$$|2 - 2| = 0$$

$$0 = 0$$

$$0 = 0 \checkmark$$

check

$$|\frac{2}{3}(6) - 6| - 2 = 0$$

$$|-2| - 2 = 0$$

$$2 - 2 = 0$$

$$0 = 0 \checkmark$$