

Solutions

1. Find x if

$$x^2 + 7x + 12 = 0$$

Factoring yields

$$(x+3)(x+4) = 0$$

$$x+3=0 \Rightarrow x = -3$$

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

2. Find x if

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

(Try this one two ways...one with and one without the quadratic formula)

(a) Quad. Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ or $x = \frac{-2 \pm \sqrt{4 + 16}}{2}$ $x = \frac{-2 \pm \sqrt{20}}{2} = -1 \pm \sqrt{5}$

(b) Completing the square

$$x^2 + 2x = 4,$$

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

3. Simplify (ie, write with fewer fraction bars)

$$\frac{\frac{1}{x+h} - \frac{1}{x}}{h}$$

Common denominator up top...

$$\frac{\frac{x}{x(x+h)} - \frac{x+h}{x(x+h)}}{h} \rightarrow \frac{\frac{x - (x+h)}{x(x+h)}}{h} = \frac{\frac{-h}{x(x+h)}}{h} = \frac{1}{x(x+h)}$$

4. Solve for x :

$$\frac{x^2 + 8x + 3}{x - 3} = 2x + 8$$

Cross multiplication \rightarrow

$$x^2 + 8x + 3 = (2x + 8)(x - 3)$$

$$x^2 + 8x + 3 = 2x^2 + 2x - 24 \rightarrow x^2 - 6x - 27 = 0 \rightarrow$$

(combine terms) $(x - 9)(x + 3) = 0$ $x = 9, -3$

5. Simplify (write as separate fractions)

$$\frac{x^3 + 2x^2 - 1}{2x}$$

$$\rightarrow \frac{x^3}{2x} + \frac{2x^2}{2x} - \frac{1}{2x} = \frac{x^2}{2} + x - \frac{1}{2x}$$

6. Simplify

$$\frac{x^2 - 10x + 16}{x^2 + x - 6} = \frac{(x - 2)(x - 8)}{(x - 2)(x + 3)} = \frac{(x - 8)}{x + 3}$$

7. Rationalize the Denominator in

$$\frac{x}{\sqrt{x^2 + 4} - 2} \cdot \frac{\sqrt{x^2 + 4} + 2}{\sqrt{x^2 + 4} + 2}$$

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

$$= \frac{\sqrt{x^2 + 4} + 2}{x}$$