

Instructions: Show all work. Give exact answers unless specifically asked to round.

1. Simplify $\frac{1}{(x+h)^2} - \frac{1}{x^2}$.

$$\frac{1}{h} \left[\frac{x^2 - (x+h)^2}{x^2(x+h)^2} \right] = \frac{1}{h} \left[\frac{\cancel{x^2} - \cancel{x^2} - 2xh - h^2}{x^2(x+h)^2} \right]$$

$$= \frac{1}{h} \left[\frac{-2xh - h^2}{x^2(x+h)^2} \right] = \frac{1}{h} \left[\frac{h(-2x-h)}{x^2(x+h)^2} \right] = \frac{-2x-h}{x^2(x+h)^2}$$

2. Solve $\left[\frac{3x}{5} - \frac{x-3}{2} = \frac{x+2}{3} \right] 30$

$$6(3x) - 15(x-3) = 10(x+2)$$

$$18x - 15x + 45 = 10x + 20$$

$$3x + 45 = 10x + 20$$

$$\begin{array}{r} -10x \quad -45 \quad -10x \quad -45 \\ \hline \end{array}$$

$$\begin{array}{r} -7x \quad = \quad -25 \\ \hline -7 \quad \quad -7 \end{array}$$

$$x = \frac{25}{7}$$

3. Solve. Find all real and complex solutions.

a. $5x^2 + 2 = 11x$

$$5x^2 - 11x + 2 = 0$$

$$(5x-1)(x-2) = 0$$

$$x = 1/5, 2$$

b. $x^2 - 4x + 29 = 0$

$$x = \frac{4 \pm \sqrt{16 - 116}}{2} = \frac{4 \pm \sqrt{-100}}{2} = \frac{4 \pm 10i}{2} = 2 \pm 5i$$