

Solutions

1. Simplify.

a) $(3x^2 - 7x + 5) + (x^2 - x + 3)$

$$= 3x^2 - 7x + 5 + x^2 - x + 3$$

$$= 4x^2 - 8x + 8$$

b) $(x^2 - 6x + 1) - (-x^2 - 6x + 5)$

$$= x^2 - 6x + 1 + x^2 + 6x - 5$$

$$= 2x^2 - 4$$

c) $(2x^2 - 4x + 3) - (x^2 - 3x + 2) + (x^2 - 1)$

$$= 2x^2 - 4x + 3 - x^2 + 3x - 2 + x^2 - 1$$

$$= 2x^2 - x$$

4. Simplify.

a) $(2a + 4c + 8) + (7a - 9c - 3)$

$$= 2a + 4c + 8 + 7a - 9c - 3$$

$$= 9a - 5c + 5$$

c) $(6x + 2y + 9) + (-3x - 5y - 8)$

$$= 6x + 2y + 9 - 3x - 5y - 8$$

$$= 3x - 3y + 1$$

e) $(-4x^2 - 2xy) + (6x^2 - 3xy + 2y^2)$

$$= -4x^2 - 2xy + 6x^2 - 3xy + 2y^2$$

$$= 2x^2 - 5xy + 2y^2$$

5. Simplify.

a) $(m - n + 2p) - (3n + p - 7)$

$$= m - n + 2p - 3n - p + 7$$

$$= m - 4n + p + 7$$

c) $(4a^2 - 9) - (a^3 + 2a - 9)$

$$= 4a^2 - 9 - a^3 - 2a + 9$$

$$= -a^3 + 4a^2 - 2a$$

e) $(3x^2 + 2y^2 + 7) - (4x^2 - 2y^2 - 8)$

$$= 3x^2 + 2y^2 + 7 - 4x^2 + 2y^2 + 8$$

$$= -x^2 + 4y^2 + 15$$

6. Simplify.

e) $\left(\frac{1}{2}x + \frac{1}{3}y\right) - \left(\frac{1}{5}x - y\right)$

$$= \frac{1}{2}x + \frac{1}{3}y - \frac{1}{5}x + y$$

$$= \frac{1}{2}x - \frac{1}{5}x + \frac{1}{3}y + y$$

$$= \frac{5}{10}x - \frac{2}{10}x + \frac{1}{3}y + \frac{3}{3}y$$

$$= \frac{3}{10}x + \frac{4}{3}y$$

f) $\left(\frac{3}{4}x + \frac{1}{2}y\right) - \left(\frac{2}{3}x + \frac{1}{4}y - 1\right)$

$$= \frac{3}{4}x + \frac{1}{2}y - \frac{2}{3}x - \frac{1}{4}y + 1$$

$$= \frac{3}{4}x - \frac{2}{3}x + \frac{1}{2}y - \frac{1}{4}y + 1$$

$$= \frac{9}{12}x - \frac{8}{12}x + \frac{2}{4}y - \frac{1}{4}y + 1$$

$$= \frac{1}{12}x + \frac{1}{4}y + 1$$

$$= \frac{1}{12}x + \frac{1}{4}y + 1$$

8. Determine whether each pair of functions is equivalent.

a) $f(x) = (2x^2 + 7x - 2) - (3x + 7)$ and
 $g(x) = (x^2 + 12) + (x^2 + 4x - 17)$

$$f(x) = 2x^2 + 7x - 2 - 3x - 7$$

$$= 2x^2 + 4x - 9$$

$$g(x) = x^2 + 12 + x^2 + 4x - 17$$

$$= 2x^2 + 4x - 5$$

 \Rightarrow They are NOT equivalent

f) $f(m) = m(5 - m) - 2(2m - m^2)$ and
 $g(m) = 4m^2(m - 1) - 3m^2 + 5m$

$$f(m) = 5m - m^2 - 4m + 2m^2$$

$$= m^2 + m$$

$$g(m) = 4m^3 - 4m^2 - 3m^2 + 5m$$

$$= 4m^3 - 7m^2 + 5m$$

 \Rightarrow They are NOT equivalent

11. The two equal sides of an isosceles triangle each have a length of $2x + 3y - 1$. The perimeter of the triangle is $7x + 9y$. Determine the length of the third side.

$$\text{Equal sides total } 2(2x + 3y - 1)$$

$$\text{Perimeter is } 7x + 9y$$

$$\begin{aligned} \Rightarrow 3^{\text{RD}} \text{ side} &= 7x + 9y - 2(2x + 3y - 1) \\ &= 7x + 9y - 4x - 6y + 2 \\ &= 3x + 3y + 2 \end{aligned}$$

12. Tino owns a small company that produces and sells cellphone cases. The revenue and cost functions for Tino's company are shown below, where x represents the selling price in dollars.

$$\text{Revenue: } R(x) = -50x^2 + 2500x$$

$$\text{Cost: } C(x) = 150x + 9500$$

- a) Write the simplified form of the profit function, $P(x) = R(x) - C(x)$.
b) What profit will the company make if it sells the cases for \$12 each?

$$\begin{aligned} \text{a) } P(x) &= (-50x^2 + 2500x) - (150x + 9500) \\ &= -50x^2 + 2500x - 150x - 9500 \\ &= -50x^2 + 2350x - 9500 \end{aligned}$$

$$\begin{aligned} \text{b) } P(12) &= -50(12)^2 + 2350(12) - 9500 \\ &= -50(144) + 28200 - 9500 \\ &= -7200 + 28200 - 9500 \\ &= \$11,500 \end{aligned}$$