

Unit 2 Equivalent Algebraic Expressions

2.1 Adding and Subtracting Polynomials

Examples: Simplify the following

$$\begin{aligned} 1) & (2x^2 - 4x + 3) - (x^2 - 3x + 2) + (x^2 - 1) \\ &= \underline{2x^2} - \underline{4x} + 3 - \underline{x^2} + \underline{3x} - 2 + \underline{x^2} - 1 \\ &= \underline{\underline{2x^2 - x}} \end{aligned}$$

$$\begin{aligned} 2) & \frac{1}{2}x + \frac{1}{3}y - \left(\frac{1}{5}x - y\right) \\ &= \frac{1}{2}x + \frac{1}{3}y - \frac{1}{5}x + y \\ &= \frac{5}{10}x - \frac{2}{10}x + \frac{1}{3}y + \frac{3}{3}y \\ &= \underline{\underline{\frac{3}{10}x + \frac{4}{3}y}} \end{aligned}$$

Determine whether each pair of functions is equivalent:

$$\begin{aligned} 3) & f(m) = m(5 - m) - 2(2m - m^2) \quad \text{and} \\ & g(m) = 4m^2(m - 1) - 3m^2 + 5m \end{aligned}$$

$$\begin{aligned} f(m) &= 5m - m^2 - 4m + 2m^2 \\ \therefore f(m) &= \underline{\underline{m^2 + m}} \end{aligned}$$

$$\begin{aligned} g(m) &= 4m^3 - 4m^2 - 3m^2 + 5m \\ \therefore g(m) &= \underline{\underline{4m^3 - 7m^2 + 5m}} \end{aligned}$$

$\therefore g(m)$ and $f(m)$
are not equivalent

2.2 Multiplying Polynomials

Examples: Expand and simplify the following:

$$\begin{aligned} 1) & (x+1)(x^2+2x-3) \\ & = x^3 + 2x^2 - 3x + x^2 + 2x - 3 \\ & = \underline{x^3 + 3x^2 - x - 3} \end{aligned}$$

$$\begin{aligned} 2) & 2(3a+4)(a-6) - (3-a)^2 + 4(5-a) \\ & = (6a+8)(a-6) - (a^2 - 6a + 9) + (20-4a) \\ & = 6a^2 - 36a + 8a - 48 - a^2 + 6a - 9 + 20 - 4a \\ & = \underline{5a^2 - 26a - 37} \end{aligned}$$

Determine whether each pair of expressions is equivalent:

$$\begin{aligned} 3) & 3(y-2x)^3 \text{ and } -24x^3 + 36x^2y - 18xy^2 + 3y^3 \\ & 3(y-2x)^3 \\ & = 3(y-2x)(y-2x)(y-2x) \\ & = 3(y-2x)(y^2 - 2xy - 2xy + 4x^2) \\ & = 3(y-2x)(y^2 - 4xy + 4x^2) \\ & = 3(y^3 - 4xy^2 + 4x^2y - 2xy^2 + 8x^2y - 8x^3) \\ & = 3(y^3 - 6xy^2 + 12x^2y - 8x^3) \\ & = 3y^3 - 18xy^2 + 36x^2y - 24x^3 \\ & = -24x^3 + 36x^2y - 18xy^2 + 3y^3 \end{aligned}$$

\therefore the expressions are equivalent

Homework: p107 #1-7