

Handout - More Polynomials

Multiply the polynomials

$$\text{a) } (x - 8)(3x + 4)(x^2 - 2x) \quad \text{c) } (3\sqrt{x} - 6)(3\sqrt{x} + 1)(3x^{3/2} - 5\sqrt{x})$$

$$\text{b) } (x^3 + 1)(x^3 + 3)(5x^4 + 6x^3) \quad \text{d) } (x^{7/2} + 9)(4x^{7/2} - 1)(5x^{9/2} - 9x^{7/2})$$

Multiply and Add the polynomials

$$\text{a) } -x^{12} - 4x^{11} - x^{10} + (-7x^6 - x^5)(8x^5 - 3x^6)$$

$$\text{b) } -8x^4 - 8x^3 - 3x^2 + (9x - 8x^2)(-4x^2 - 8x)$$

$$\text{c) } (-x^{3/2} - 5\sqrt{x})(3x^{3/2} + 6\sqrt{x}) - 7x^3 + 8x^2 - 4x$$

$$\text{d) } (-8x^{3/2} - 7\sqrt{x})(-3x^{3/2} - 4\sqrt{x}) - 6x^3 - 4x^2 + x$$

Answers a) $3x^4 - 26x^3 + 8x^2 + 64x$; b) $5x^{10} + 6x^9 + 20x^7 + 24x^6 + 15x^4 + 18x^3$; c) $27x^{5/2} - 63x^{3/2} - 45x^2 + 75x + 30\sqrt{x}$; d) $20x^{23/2} - 36x^{21/2} - 45x^{9/2} + 81x^{7/2} + 175x^8 - 315x^7$;

Answers a) $20x^{12} - 57x^{11} - 9x^{10}$; b) $24x^4 + 20x^3 - 75x^2$; c) $-10x^3 - 13x^2 - 34x$; d) $18x^3 + 49x^2 + 29x$;

Multiply, Simplify (gather like x-terms).

a) $(2x^3 + 6)(5x^3 + 1)(5x^4 + 2x^3)$ b) $(x^2 - 7)(2x^2 - 1)(x^3 - 4x^2)$

c) $(x^2 + 5)(5x^2 - 2)(5x^3 - x^2)$ d) $(2x^3 - 2)(2x^3 + 7)(2x^4 - 2x^3)$

Multiply and Simplify.

a) $(x - \sqrt{6} + 2)(x + \sqrt{6} + 2)$ b) $(x - \sqrt{6} + 6)(x + \sqrt{6} + 6)$

c) $(x - \sqrt{5} - 1)(x + \sqrt{5} - 1)$ d) $(x - \sqrt{11} - 9)(x + \sqrt{11} - 9)$

e) $(2x - \sqrt{6} - 1)(2x + \sqrt{6} - 1)$ f) $(4x - \sqrt{7} - 5)(4x + \sqrt{7} - 5)$

Answers a) $50x^{10} + 20x^9 + 160x^7 + 64x^6 + 30x^4 + 12x^3$; b) $2x^7 - 8x^6 - 15x^5 + 60x^4 + 7x^3 - 28x^2$;
c) $25x^7 - 5x^6 + 115x^5 - 23x^4 - 50x^3 + 10x^2$; d) $8x^{10} - 8x^9 + 20x^7 - 20x^6 - 28x^4 + 28x^3$;

Answers a) $x^2 + 4x - 2$; b) $x^2 + 12x + 30$; c) $x^2 - 2x - 4$; d) $x^2 - 18x + 70$; e) $4x^2 - 4x - 5$; f)
 $16x^2 - 40x + 18$;

Find the points (x, y) of intersection. (Sketch the graphs)

a) $y = x^2 - 3, y = x + 9$

b) $y = x^2 - 3, y = x + 9$

c) $y = x^2 - 6, y = -x$

d) $y = x^2 - 7, y = 3 - 3x$

Find the exact value of x . Try Completing the Square

a) $x^2 + 16x + 57 = 0$

b) $x^2 - 18x + 60 = 0$

c) $x^2 + 18x + 70 = 0$

d) $x^2 + 18x + 76 = 0$

e) $9x^2 - 6x - 6 = 0$

f) $9x^2 + 36x + 17 = 0$

Answers a) $(x, y) = \{-3, 6\}, \{4, 13\}$; b) $(x, y) = \{-3, 6\}, \{4, 13\}$; c) $(x, y) = \{-3, 3\}, \{2, -2\}$; d) $(x, y) = \{-5, 18\}, \{2, -3\}$;

Answers a) $x = -8 \pm \sqrt{7}$; b) $x = 9 \pm \sqrt{21}$; c) $x = -9 \pm \sqrt{11}$; d) $x = -9 \pm \sqrt{5}$; e) $x = \frac{1}{3} \pm \frac{\sqrt{7}}{3}$; f) $x = -2 \pm \frac{\sqrt{19}}{3}$;

Use Partial Fraction Technique to Decompose into two fractions

a) $\frac{-2x - 12}{x^2 + 17x + 72}$

b) $\frac{9x + 42}{x^2 + 9x + 18}$

c) $\frac{4}{x^2 + 6x + 8}$

d) $\frac{6}{x^2 + 5x + 6}$

Express the fraction in the form *quotient* + $\frac{\text{remainder}}{\text{divisor}}$:

(degree of remainder < degree of divisor)

a) $\frac{x - 8}{x - 6}$

b) $\frac{19 - 6x}{x - 2}$

c) $\frac{5x^2 - 29x - 43}{x - 7}$

d) $\frac{7x^2 - 13x + 4}{x - 1}$

Answers a) $\frac{4}{x+8} - \frac{6}{x+9}$; b) $\frac{4}{x+6} + \frac{5}{x+3}$; c) $\frac{2}{x+2} - \frac{2}{x+4}$; d) $\frac{6}{x+2} - \frac{6}{x+3}$;

Answers a) $1 - \frac{2}{x-6}$; b) $-6 + \frac{7}{x-2}$; c) $5x + 6 - \frac{1}{x-7}$; d) $7x - 6 - \frac{2}{x-1}$;