Handout 2 - More Polynomials

Multiply the polynomials

a) $\left(4x^2+9\right)\left(5x^2-1\right)\left(2x^3+8x^2\right)$

b) $\left(3x^2-2\right)\left(4x^2-3\right)\left(5x^3+5x^2\right)$

c) $\left(4x^{5/2}+6\right)\left(5x^{5/2}-4\right)\left(2x^{7/2}+6x^{5/2}\right)$

d) $\left(4x^{5/2}-4\right)\left(4x^{5/2}+9\right)\left(5x^{7/2}+2x^{5/2}\right)$

Multiply and Add the polynomials

a) $5x^8+x^7-5x^6+\left(2x^3-6x^4\right)\left(2x^4+5x^3\right)$

b) $-2x^4-7x^3+2x^2+\left(-7x^2-2x\right)\left(-2x^2-3x\right)$

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

d) $\left(-7x^{3/2}-5\sqrt{x}\right)\left(-2x^{3/2}-6\sqrt{x}\right)+8x^3+x^2-6x$

Answers a) $40x^7+160x^6+82x^5+328x^4-18x^3-72x^2$; b) $60x^7+60x^6-85x^5-85x^4+30x^3+30x^2$; c) $40x^{17/2}+120x^{15/2}-48x^{7/2}-144x^{5/2}+28x^6+84x^5$; d) $80x^{17/2}+32x^{15/2}-180x^{7/2}-72x^{5/2}+100x^6+40x^5$;

Answers a) $-7x^8-25x^7+5x^6$; b) $12x^4+18x^3+8x^2$; c) $9x^3+20x^2-49x$; d) $22x^3+53x^2+24x$;

Multiply, Simplify (gather like x-terms).

a) $\left(4x^3-2\right)\left(4x^3+1\right)\left(3x^4-2x^3\right)$ b) $(5x+1)(5x+7)\left(2x^2-9x\right)$

c) $\left(2x^3+8\right)\left(4x^3-1\right)\left(4x^4-7x^3\right)$ d) $\left(3x^3+2\right)\left(5x^3+5\right)\left(5x^4-3x^3\right)$

Multiply and Simplify.

a) $\left(x-\sqrt{5}-1\right)\left(x+\sqrt{5}-1\right)$ b) $\left(x-\sqrt{13}+8\right)\left(x+\sqrt{13}+8\right)$

c) $\left(x-\sqrt{3}+7\right)\left(x+\sqrt{3}+7\right)$ d) $\left(x-\sqrt{6}+5\right)\left(x+\sqrt{6}+5\right)$

e) $\left(2x-\sqrt{6}+5\right)\left(2x+\sqrt{6}+5\right)$ f) $\left(3x-\sqrt{3}-1\right)\left(3x+\sqrt{3}-1\right)$

Answers a) $48x^{10}-32x^9-12x^7+8x^6-6x^4+4x^3$; b) $50x^4-145x^3-346x^2-63x$; c) $32x^{10}-56x^9+120x^7-210x^6-32x^4+56x^3$; d) $75x^{10}-45x^9+125x^7-75x^6+50x^4-30x^3$;

Answers a) x^2-2x-4; b) $x^2+16x+51$; c) $x^2+14x+46$; d) $x^2+10x+19$; e) $4x^2+20x+19$; f) $9x^2-6x-2$;

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

a) $y = x^2 - 8, \quad y = -2x$

b) $y = x^2 - 5, \quad y = 2x + 10$

c) $y = x^2 - 10, \quad y = 2 - x$

d) $y = x^2 - 7, \quad y = x - 1$

Find the exact value of x. Try Completing the Square

a) $x^2 + 8x + 9 = 0$

b) $x^2 + 16x + 54 = 0$

c) $x^2 - 2x - 18 = 0$

d) $x^2 + 16x + 49 = 0$

e) $25x^2 - 70x + 46 = 0$

f) $16x^2 + 56x + 30 = 0$

Answers a) $(x, y) = \{-4, 8\},\ \{2, -4\}$; b) $(x, y) = \{-3, 4\},\ \{5, 20\}$; c) $(x, y) = \{-4, 6\},\ \{3, -1\}$; d) $(x, y) = \{-2, -3\},\ \{3, 2\}$;

Answers a) $x = -4 \pm \sqrt{7}$; b) $x = -8 \pm \sqrt{10}$; c) $x = 1 \pm \sqrt{19}$; d) $x = -8 \pm \sqrt{15}$; e) $x = \frac{7}{5} \pm \frac{\sqrt{3}}{5}$; f) $x = -\frac{7}{4} \pm \frac{\sqrt{19}}{4}$;

Use Partial Fraction Technique to Decompose into two fractions

a) $\dfrac{6x+24}{x^2+8x+12}$

b) $\dfrac{-2x-20}{x^2+10x+24}$

c) $\dfrac{24}{x^2+10x+21}$

d) $\dfrac{24}{x^2+6x+5}$

Express the fraction in the form $quotient + \frac{remainder}{divisor}$**:**
(degree of remainder $<$ degree of divisor)

a) $\dfrac{7x+26}{x+4}$

b) $\dfrac{-2x-11}{x+1}$

c) $\dfrac{5x^2-7x+8}{x-1}$

d) $\dfrac{-4x^2-10x-1}{x+3}$

Answers a) $\frac{3}{x+6}+\frac{3}{x+2}$; b) $\frac{4}{x+6}-\frac{6}{x+4}$; c) $\frac{6}{x+3}-\frac{6}{x+7}$; d) $\frac{6}{x+1}-\frac{6}{x+5}$;

Answers a) $7-\frac{2}{x+4}$; b) $-2-\frac{9}{x+1}$; c) $5x-2+\frac{6}{x-1}$; d) $-4x+2-\frac{7}{x+3}$;