

## A.3 Polynomials and Factoring

Quick Review of adding, subtracting, and multiplying polynomials.

$$\begin{aligned} & (\cancel{5x^3} - \cancel{7x^2} - \cancel{3}) + (\cancel{x^3} + \cancel{2x^2} - \cancel{x} + \cancel{8}) \\ & \quad 6x^3 - 5x^2 - x + 5 \end{aligned}$$

$$\begin{aligned} & (\cancel{7x^4} - \cancel{x^2} - \cancel{4x} + \cancel{2}) + (\cancel{-3x^4} + \cancel{4x^2} + \cancel{-3x}) \\ & \quad 4x^4 + 3x^2 - 7x + 2 \end{aligned}$$

$$\begin{aligned} & (2x^3 - x + 3) + (-x^2 + 2x + 3) \\ & \quad 2x^3 - x^2 + x + 6 \end{aligned}$$

$$(3x - 2)(3x + 2) \quad \text{conjugate}$$

$$9x^2 + 6x - 6x - 4$$

$$9x^2 - 4$$

$$(x + y - 2)(x + y + 2)$$

$$\begin{array}{r}
 x^2 + xy + 2x \\
 +xy \quad +y^2 + 2y \\
 -2x \quad -2y -4 \\
 \hline
 x^2 + 2xy + y^2 - 4
 \end{array}$$

Factoring:

GCF

$$\begin{array}{l}
 6x^3 - 4x \\
 2x(3x^2 - 2) \\
 2x(\sqrt{3}x + \sqrt{2})(\sqrt{3}x - \sqrt{2}) \star
 \end{array}$$

$$\begin{array}{l}
 (x-2)(2x) + (x-2)(3) \\
 (x-2)(2x+3)
 \end{array}$$

$$\begin{array}{l}
 -4x^2 + 12x - 16 \\
 -4(x^2 - 3x + 4) \\
 \quad \quad \quad \begin{array}{l} 1 \cdot 4 \\ 2 \cdot 2 \end{array}
 \end{array}$$

$$\begin{array}{l}
 (x+1)(x^2) - (x+1)(9) \\
 (x+1)(x^2 - 9) \\
 (x+1)(x+3)(x-3)
 \end{array}$$

## Difference of Squares

$$\begin{array}{l}
 100 - 4y^2 \quad -4(-25+y^2) \\
 4(25-y^2) \quad -4(y^2-25) \\
 4(\underline{5+y})(5-y) \quad -4(\underline{y+5})(y-5)
 \end{array}
 \qquad
 \begin{array}{l}
 16x^4 - 81 \\
 (4x^2-9)(4x^2+9) \\
 (2x+3)(2x-3)(2x+3i)(2x-3i)
 \end{array}$$

$$(x+2)^2 - y^2$$

$$\begin{array}{l}
 (x+2+y)(x+2-y) \\
 (x+2+y)(x+2-y)
 \end{array}$$

$$(x-1)^2 - 9y^4$$

$$\begin{array}{l}
 (x-1+3y^2)(x-1-3y^2) \\
 (x-1+3y^2)(x-1-3y^2)
 \end{array}$$

## Sum/Difference of Cubes

$$\begin{array}{l}
 x^3 - 27 \\
 (x-3)(x^2+3x+9)
 \end{array}$$

$$\begin{array}{l}
 64x^3 - 1 \\
 (4x-1)(16x^2+4x+1)
 \end{array}$$

$$\begin{array}{l}
 y^3 + 8 \\
 (y+2)(y^2-2y+4)
 \end{array}$$

$$\begin{array}{l}
 3x^3 + 192 \\
 3(x^3+64) \\
 3(x+4)(x^2-4x+16)
 \end{array}$$

Factoring by grouping.

$$\begin{aligned} & \underbrace{x^3 - 2x^2}_{x^2(x-2)} - \underbrace{3x + 6}_{-3(x+2)} \\ & x^2(x-2) - 3(x+2) \\ & (x-2)(x^2-3) \\ & (x-2)(x+\sqrt{3})(x-\sqrt{3}) \end{aligned}$$

$$\begin{aligned} & \underbrace{x^3 + x^2}_{x^2(x+1)} - \underbrace{5x - 5}_{-5(x-1)} \\ & x^2(x+1) - 5(x-1) \\ & (x+1)(x^2-5) \\ & (x+1)(x+\sqrt{5})(x-\sqrt{5}) \end{aligned}$$

Section A.3 Polynomials and Factoring

Pages A33 & A34 (back of book)

13, 15, 17, 25, 29, 35, 37-44, 47, 51-54, 58, 62, 64, 66, 68, 73-82

