

## PREREQUISITES PRACTICE PROBLEMS 1

### Problem 1

Simplify

$$(1) \quad \frac{1}{2}(x - 2y)^2 - x^2 - \frac{3}{2}x \left( y - \frac{1}{2} \right)$$

$$(2) \quad \left( \frac{2}{3}x - 3 \right) \left( \frac{2}{3}x + 3 \right) - (1 - x)(1 + x)^2$$

$$(3) \quad \frac{\frac{1}{x+1} - \frac{1}{x}}{\frac{1}{x^2}}$$

$$(4) \quad \frac{x^3 + x^2 + x + 1}{x^2 - 1} - \frac{9x^2 + 6x + 1}{3x^2 - 3x + x - 1} + \frac{2}{x}$$

### Problem 2

Factor

$$(5) \quad 16x^3 + 8x^2 + x$$

$$(6) \quad x^6 - \frac{1}{9}x^2$$

$$(7) \quad 3y^3 + 2y^2 - y$$

$$(8) \quad 2x^3 - 2 + 2x - 2x^2$$

$$(9) \quad x^4 + 4$$

### Problem 3

Solve the following equations/inequalities

$$(10) \quad \frac{2}{3}(x - 1) + 2x = 1 + \frac{8}{3}x$$

$$(11) \quad 3x^3 - 4x^2 - x = 0$$

$$(12) \quad \frac{x}{1-x} - \frac{1}{2} = \frac{2-x}{x}$$

$$(13) \quad \sqrt{x^2 - 7} = 3$$

$$(14) \quad x^5 + 1 = 0$$

$$(15) \quad \frac{3-x}{9x^2 - 2x} > 0$$