

## Tasks 01-04 - Advanced Factorization & Radicals

### Mastering Complex Algebraic Techniques

#### Problem 1: Advanced Factorization - Quadratics

Factor the following quadratic expressions completely:

- a)  $x^2 + 9x + 20$
- b)  $x^2 - 3x - 18$
- c)  $2x^2 + 7x + 3$
- d)  $3x^2 - 11x + 6$
- e)  $6x^2 + 13x - 5$
- f)  $4x^2 - 12x + 9$

#### Problem 2: Factoring by Grouping & Cubes

Factor the following expressions completely:

- a)  $x^3 + 3x^2 - 4x - 12$
- b)  $2x^3 - 5x^2 - 8x + 20$
- c)  $x^3 - 125$
- d)  $8x^3 + 27$
- e)  $64x^3 - 1$
- f)  $x^3 + 4x^2 - 9x - 36$

#### Problem 3: Simplifying Radicals

Simplify the following radical expressions:

- a)  $\sqrt{72}$
- b)  $\sqrt{108x^5y^3}$
- c)  $\sqrt[3]{54a^7b^4}$
- d)  $3\sqrt{50} + 2\sqrt{32} - \sqrt{200}$
- e)  $\sqrt{45x^3} - x\sqrt{20x} + 2\sqrt{80x^3}$
- f)  $\frac{\sqrt{48x^5}}{\sqrt{3x}}$

#### Problem 4: Rationalizing Denominators

Rationalize the following expressions:

a)  $\frac{5}{\sqrt{3}}$

b)  $\frac{6}{\sqrt[3]{9}}$

c)  $\frac{3}{\sqrt{7}-2}$

d)  $\frac{4}{3+\sqrt{5}}$

e)  $\frac{\sqrt{6}-\sqrt{2}}{\sqrt{6}+\sqrt{2}}$

f)  $\frac{2\sqrt{3}}{2\sqrt{3}-3\sqrt{2}}$