

# Ma104: Mathematics for Business Major

## Tutorial 4 (Answer)

1. **Divide:**  $\frac{x^2 - 4}{x - 1} \div (x - 2)$ .

$$\frac{x^2 - 4}{x - 1} \div (x - 2) = \frac{x^2 - 4}{x - 1} \div \frac{x - 2}{1}$$

Write  $x - 2$  as a fraction with a denominator of 1.

$$= \frac{x^2 - 4}{x - 1} \cdot \frac{1}{x - 2}$$

Invert the divisor and multiply.

$$= \frac{x^2 - 4}{(x - 1)(x - 2)}$$

Multiply the numerators and the denominators.

$$= \frac{(x + 2)(\cancel{x - 2})}{(x - 1)(\cancel{x - 2})}$$

Factor the numerator.

$$= \frac{x + 2}{x - 1}$$

Divide out the common factors.

2. **Simplify**  $\frac{x^2 + 2x - 3}{6x^2 + 5x + 1} \div \frac{2x^2 - 2}{2x^2 - 5x - 3} \times \frac{6x^2 + 4x - 2}{x^2 - 2x - 3}$ .

$$\frac{x^2 + 2x - 3}{6x^2 + 5x + 1} \div \frac{2x^2 - 2}{2x^2 - 5x - 3} \cdot \frac{6x^2 + 4x - 2}{x^2 - 2x - 3}$$

$$= \frac{x^2 + 2x - 3}{6x^2 + 5x + 1} \cdot \frac{2x^2 - 5x - 3}{2x^2 - 2} \cdot \frac{6x^2 + 4x - 2}{x^2 - 2x - 3}$$

$$= \frac{(x^2 + 2x - 3)(2x^2 - 5x - 3)(6x^2 + 4x - 2)}{(6x^2 + 5x + 1)(2x^2 - 2)(x^2 - 2x - 3)}$$

$$= \frac{\overset{1}{(x + 3)}(\overset{1}{\cancel{(x - 1)}})(\overset{1}{\cancel{(2x + 1)}})(\overset{1}{\cancel{(x - 3)}})2(\overset{1}{(3x - 1)})(\overset{1}{\cancel{(x + 1)}})}{\overset{1}{(3x + 1)}(\overset{1}{\cancel{(2x + 1)}})2(\overset{1}{(x + 1)})(\overset{1}{\cancel{(x - 1)}})(\overset{1}{\cancel{(x - 3)}})(\overset{1}{\cancel{(x + 1)}})}$$

$$= \frac{(x + 3)(3x - 1)}{(3x + 1)(x + 1)}$$

3. Find the possible rational roots of each equation:

A)  $x^3 - 5x^2 - x + 5 = 0$

$$(x - 1)(x + 1)(x - 5) = 0$$

$$x = 1, -1, 5$$

B)  $30x^3 - 47x^2 - 9x + 18 = 0$

$$(5x + 3)(3x - 2)(2x - 3) = 0$$

$$x = -3/5, 2/3, 3/2$$

C)  $15x^3 - 61x^2 - 2x + 24 = 0$

$$(3x - 2)(5x + 3)(x - 4) = 0$$

$$x = 2/3, -3/5, 4$$