

# Ma104: Mathematics for Business Major

## Assignment 3 (Answer)

### 1. Perform the indicated operations

A)  $(3a - 2xy) + (5xy - 7a)$  [3 marks]

$$\begin{aligned}(3a - 2xy) + (5xy - 7a) &= 3a - 2xy + 5xy - 7a \\ &= -4a + 3xy\end{aligned}$$

B)  $(x^2 - 3x - 4) - (x^2 + 3x - 7)$  [3 marks]

$$\begin{aligned}(x^2 - 3x - 4) - (x^2 + 3x - 7) &= x^2 - 3x - 4 - x^2 - 3x + 7 \\ &= -6x + 3\end{aligned}$$

C)  $(3x^2 + x - 2) \cdot (x^2 - x + 2)$  [3 marks]

$$(3x^2 + x - 2)(x^2 - x + 2) = 3x^4 - 2x^3 + 3x^2 + 4x - 4$$

D)  $(x^3 + x^2 - 11x + 10) \div (x - 2)$  (Using Synthetic Division) [4 marks]

$$(x^3 + x^2 - 11x + 10) \div (x - 2) = x^2 + 3x - 5$$

$$\begin{array}{r|rrrr} 2 & 1 & 1 & -11 & 10 \\ & & 2 & 6 & 10 \\ \hline & 1 & 3 & -5 & 0 \end{array}$$

### 2. Solve the equation $2x^4 + 7x^3 + x^2 - 7x - 3 = 0$ and find all the real roots. [10 marks]

$$2x^4 + 7x^3 + x^2 - 7x - 3 = 0$$

$$(x - 1)(x + 1)(x + 3)(2x + 1) = 0$$

$$x = \left\{ -3, -1, -\frac{1}{2}, 1 \right\}$$

### 3. Given a polynomial function $f(x) = (x - 1)^2(x + 3)(x + 1)$ , find the x-intercept and y-intercept. [8 marks]

*x-intercept:*  $-3, -1, 1$

*y-intercept:*  $3$

### 4. Given that $f(x) = x^3 - 12x + 16$ , $g(x) = x - 2$

A) Factorize  $f(x)$ . [3 marks]

$$\begin{aligned}f(x) &= x^3 - 12x + 16 \\ &= (x - 2)^2(x + 4)\end{aligned}$$

**B) Find  $(f/g)(x)$ . [4 marks]**

$$\begin{aligned}(f/g)(x) &= f(x) / g(x) \\ &= (x-2)^2(x+4) / (x-2) \\ &= (x-2)(x+4)\end{aligned}$$

**C) Find  $(f \circ g)(2)$ . [6 marks]**

$$\begin{aligned}g(x) &= x - 2, \quad g(2) = 0 \\ (f \circ g)(2) &= f[g(2)] \\ &= f(0) \\ &= (0)^3 - 12(0) + 16 \\ &= 16\end{aligned}$$

**D) If  $f(x) = 0$ , solve for  $x$ . [6 marks]**

$$\begin{aligned}\text{If } f(x) = 0, \quad x^3 - 12x + 16 &= 0 \\ (x-2)^2(x+4) &= 0 \\ x &= -4 \text{ or } 2\end{aligned}$$