AQA, Edexcel, OCR, MEI

A Level

A Level Mathematics

C1 Polynomials

Name:

MME

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Total Marks: /87

1. Compute $\frac{x^3+2x^2-7x-2}{x-2}$ by using polynomial division. [2]

2. Find the remainder of the quotient $\frac{x^3+10x^2+5}{x-2}$. [2]

3. The remainder when $x^3 + 3x^2 + kx + 1$ is divided by $x + 2$ is 1. Find k. [3]

4. Factorise fully the following polynomials. *You may need to use the factor theorem*:

   (a) $x^3 + 2x^2 + x$. [2]

   (b) $x^3 - 6x^2 + 11x - 6$. [3]

   (c) $x^3 - 4x^2 + 5x - 2$. [3]

   (d) $2x^3 + 7x^2 + 2x - 3$. [3]

   (e) $x^4 - 2x^2 + 1$. [2]

5. Solve the following equations. *Hint: to save time, use your answers from the previous question*:

   (a) $x^3 + 2x^2 + x = 0$. [2]

   (b) $x^3 - 6x^2 + 11x - 6 = 0$. [3]

   (c) $2x^3 + 7x^2 + 2x - 3 = 0$. [3]

6. Consider the function $f(x) = ax^3 + bx^2 + 27x - 10$, where a and b are unknown coefficients:

   (a) You are given that $f(1) = f(2) = 0$. Hence find a and b. [3]

   (b) Fully factorise $f(x)$. *You may need to use polynomial division.* [3]

   (c) Using your answer to (b), solve $f(x) = 0$. [2]

7. Sketch the following functions, clearly indicating the points of any intersections with the axes:

   (a) $y = (x - 1)(x - 2)(x - 3)$. [2]

   (b) $y = -(x - 1)(x - 2)(x - 3)$ [2]

   (c) $y = (x - 1)^2(x - 2)$ [2]

   (d) $y = x(2x - 3)(x - 1)$ [2]

8. Expand the following expressions. *Hint: use Pascal's triangle and binomial expansion:*

   (a) $(x+1)^4$. [2]

   (b) $(x+2)^3$. [2]

   (c) $(2x+3)^4$. [2]

   (d) $(2x+1)^3(x+2)$. [3]

9. Evaluate the following binomial coefficients:

   (a) $\binom{1}{0}$. [2]

   (b) $\binom{5}{1}$. [2]

   (c) $\binom{3}{2}$. [2]

   (d) $\binom{4}{3}$. [2]

   (e) $^5C_3$. [2]

   (f) $^1C_0$. [2]

   (g) $^3C_2$. [2]

   (h) $^4C_3$. [2]

   (i) $^5C_5$. [2]

10. Find the coefficient of x^3 in the expansion of $(2x+3)^3$. [3]

11. Find the coefficient of x^5 in the expansion of $(3x-1)^7$. [4]

12. Find the coefficient of x^4 in the expansion of $(3x-5)^6$. [4]

13. Find the coefficient of x^3 in the expansion of $(2-x)^6(x-3)$. [5]