Specialist Methods (Year 11)

(Polynomials and Equations)

Practice Test #3

Please Note: Use calculator where necessary. *Max Marks: 50* *Time: 3600 sec*

1. Factor the following polynomials completely, and state all the zeroes. [2+2]

   (a) $2x^4 - x^3 - x^2$

   (b) $x^6 - 1$

2. (a) Show that if $P(x) = ax^4 + bx^3 + cx^2 + dx + e$ is **even**, then $b = d = 0$. [3+3]

   (b) Show that if $Q(x) = ax^5 + bx^4 + cx^3 + dx^2 + ex + f$ is **odd**, then $b = d = f = 0$.

3. Sketch graphs of the following polynomials, clearly indicating all intercepts with the axes:

   (a) $y = (2-x)^2(5-x)$ [3+3]

   (b) $f(x) = -2x^2 + 9x - 7$

4. Find the coordinates of the points where the graph of $y = p(x)$, $p(x) = x^4 - 2x^2 + 1$, crosses the x- and y-axes, and hence sketch the graph. [4]

5. (a) Find the quotient and remainder when $x^4 - 2x^3 + x^2 - 5x + 7$ is divided by $x^2 + x - 1$. [3+3]

   (b) Find **a** and **b** if $x^4 - 2x^3 + x2 + ax + b$ is exactly divisible by $x^2 + x - 1$.

6. The polynomial $P(x) = x^4 - 2x^3 + ax + b$ has remainder 3 after division by $x-1$, and has remainder -5 after division by $x+1$. Find **a** and **b**. [4]

7. The polynomial $P(x)$ is divided by $(x + 4)(x - 3)$.

   Find the remainder, given that $P(-4) = 11$ and $P(3) = -3$. [4]

8. Factorize completely $P(x) = x^4 + x^3 - 9x^2 + 11x - 4$ [4]

9. When $x^5 + 3x^3 + ax + b$ is divided by $x^2 - 1$, the remainder is $2x - 7$. Find **a** and **b**. [4]

10. (a) Show that the equation of the normal to the curve $\mathbf{x^2 = 4y}$ at the point $(2t, t^2)$

    is $\mathbf{x + ty - 2t - t^3} = 0$. [6+2]

    (b) If the normal passes through the point $(-2, 5)$, find the value of **t**.

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