

Mathematics for Science

Assignment 5

Polynomials: Remainder and Factor Theorem

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Instructions: Attempt all the Questions

- 1) Find the remainder when the expressions below are divided by $(x - 2)$ and $(3x + 2)$.
 - a) $x^3 + 2x + 1$
 - b) $4x^4 + 2x^3 - x^2 - 3x - 2$
 - c) $x^5 - x^7 - 9$
 - d) $x^4 - x^3 + x^2 + x - 1$
- 2) Use the remainder theorem to determine the remainder when the following expressions are divided by $(x - 1)$, $(2x + 1)$, $(x + 3)$.
 - a) $x^{23} + x^{20} - x + 1$
 - b) $x^3 + x^7 - 2x^2 + 1 - 2x$
 - c) $3x^2 + 2x + 5$
 - d) $2x^3 - 2x^2 - 7x + 12$
- 3) Find the numerical value of a if the $x^3 + 2x^2 - 3ax + 2$ is divisible $(x + 1)$.
- 4) Show that $(x + 3)$ is not a factor of $x^6 - 9$
- 5) Determine the roots of the expression $x^3 - 2x^2 + 3x + n$ if $(x - 2)$ is a factor.
- 6) Suppose $(x + 2)$ and $(x - 5)$ are factors of $x^4 - ax^3 + 5x^2 + bx - 30$. Find the numerical value of a and b .
- 7) Apply synthetic division to determine the remainder and the quotient of the following expressions when divided by; $(x + 2)$, $(2x - 3)$, and $(3x - 5)$.
 - a) $x^3 + 2x^2 - x + 3$
 - b) $5x^4 + x^2 - 3x - 9$
 - c) $x^7 + x^3 - 12$
 - d) $x^4 + 2x^3 + x^2 - 2x + 8$
- 8) Suppose the roots of $3x^3 + 2x^2 + 2x - 6 = 0$ are α , β , and μ . Determine without solving of $3x^3 + 2x^2 + 2x - 6 = 0$ a polynomial whose roots are $\alpha - 1$, $\beta - 1$, $\mu - 1$.
- 9) Suppose the roots of $x^3 - 5x^2 - 3x - 7 = 0$ are α , β , and μ . Determine without solving of $x^3 - 5x^2 - 3x - 7 = 0$ a polynomial whose roots are $\alpha + 2$, $\beta + 2$, $\mu + 2$.