

Spring, 1999
Peterson

MATH 124.

Homework 8.

DUE: Friday, March 26.

P1. Consider the polynomial $P(x) = 3x^3 + x^2 + x + 35$.

- (1) Determine the full list of candidates for rational zeroes, according to the rational root test.
- (2) Find a rational zero for $P(x)$. Explain briefly how you found it.
- (3) Use your answer in (2) to factor $P(x)$ into a linear factor and a quadratic factor, each of which has integer coefficients.
- (4) Find exact values for all real/complex number solutions to $P(x) = 0$.

P2. Find exact values for all real/complex number solutions in each case. As usual, show your work.

(1) $x^3 - 21x^2 + 19x + 20 = 0$.

(2) $x^3 + 3x^2 - 23x + 35 = 0$.

(3) $x^4 - x^3 - x^2 - x - 2 = 0$.

(4) $(x - 1)(5x^2 + 3x) = x^3 - x$.

P3. Consider the polynomial $P(x) = x^4 - 8x^3 + 21x^2 - 14x - 10$.

- (1) It turns out that $3 + i$ is a zero for $P(x)$. Use this fact to factor $P(x)$ as a product of two quadratic polynomials with real coefficients.
- (2) Find exact values for all real/complex number solutions to $P(x) = 0$.

P4. Suppose that $P(x)$ is a cubic polynomial with real coefficients. Suppose that 2 and $1 - i$ are zeroes for $P(x)$ and it is known that $P(4) = 60$. Find $P(x)$.