Honors Algebra II

Notes Section 2.5

Apply the Remainder and Factor Theorems

EXAMPLE 1 Divide using long division.

a) $f(x) = x^3 + 5x^2 - 7x + 2$ by $x - 2$

b) $f(x) = 3x^4 - 5x^3 + 4x - 6$ by $x^2 - 3x + 5$

c) $(2x^4 + x^3 + x + 1) \div (x^2 + 2x - 1)$

Remainder Theorem: using synthetic division with a linear divisor.
The last value = remainder.

Factor Theorem: if the remainder = 0, then x-k is a factor.

EXAMPLE 2 Divide using synthetic division.

a) $f(x) = 2x^3 + x^2 - 8x + 5$ by $x + 3$

b) $f(x) = 2x^3 + 9x^2 + 14x + 5$ by $x - 3$

EXAMPLE 3 Factor completely given one factor.

a) $f(x) = 3x^3 - 4x^2 - 28x - 16$
$x + 2$

b) $g(x) = x^3 - 6x^2 + 5x + 12$
$x - 4$

EXAMPLE 4 What is another zero?

a) $f(x) = x^3 - 2x^2 - 23x + 60$
$x = 3$

b) $g(x) = x^3 - x^2 - 22x + 40$
$x = -5$

EXAMPLE 5 The profit P (in millions) for a shoe manufacturer can be modeled by $P = -21x^3 + 46x$ where x is the number of shoes produced (in millions). The company now produces 1 million shoes and makes a profit of $25,000,000, but would like to cut back production. What lesser number of shoes could the company produce and still make the same profit?