MATH 125 College Algebra OpenStax Name:_____Section_____

Section 5.5 Zeros of Polynomial Functions Professor _____

The Remainder Theorem states if a polynomial *f(x)* is divided by _____, then the remainder is the value *f(k).*

Use the remainder theorem to find the remainder. $(3x^4 - x^2 - 5x - 2) \div (x + 4)$

THE FUNDAMENTAL THEOREM OF ALGEBRA

The **Fundamental Theorem of Algebra** states that, if $f(x)$ is a polynomial of degree $n > 0$, then $f(x)$ has at least one complex zero.

We can use this theorem to argue that, if $f(x)$ is a polynomial of degree $n > 0$, and $a$ is a non-zero real number, then $f(x)$ has exactly $n$ linear factors

$$f(x) = a(x - c_1)(x - c_2)...(x - c_n)$$

where $c_1, c_2, ..., c_n$ are complex numbers. Therefore, $f(x)$ has $n$ roots if we allow for multiplicities.

A polynomial of degree n has n roots,

Imaginary roots and irrational roots always occur in

Descartes's Rule of Signs

Given one zero, find all the zeros. $f(x) = 4x^3 - 7x + 3; x - 1$

$f(x) = x^3 - x^2 - 8x + 12$

$f(x) = 4x^3 + 8x^2 - 11x + 3$

$f(x) = 4x^3 + 12x^2 + x + 3$