

Pre-Calc 2.5a Notes

The Fundamental Theorem of Algebra

Fundamental Thm of Alg:

If $f(x)$ is a polynomial of degree n , where $n > 0$, then f has at least one zero in the complex number system.

What does this mean?

If you have a third degree polynomial - it will have 3 zeros (can be real and/or imaginary) and 3 linear factors!

Recall: ● → Zero = x-intercept = solution
Zero = -2 then factor is $(x + 2)$

Complex Zeros Occur in Conjugate Pairs

Let f be a polynomial function that has real coefficients. If $a + bi$, where $b \neq 0$ is a zero of the function, then the conjugate $a - bi$ is also a zero of the function.

Ex: if $-2 - 3i$ is a zero, then so is $-2 + 3i$.

You TRY: If $4 + 2i$ is a zero, then so is _____

Example 1: Match the function with its exact # of zeros.

(a) 1 zero

$$f(x) = x^2 - 14x$$

(b) 2 zeros

$$f(x) = 3x^4 - 2x - 1$$

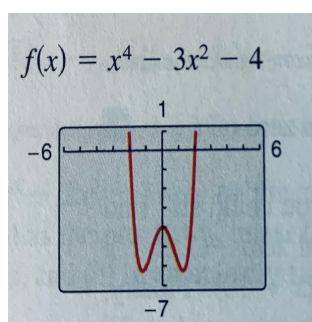
(c) 3 zeros

$$f(x) = x + 2$$

(d) 4 zeros

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

Example 2: Find all zeros of the function. What is the relationship between the number of real zeros and the number of x-intercepts of the graph?



Example 3: Find all the zeros of the function and write the polynomial as a product of linear factors.

(a) $f(x) = x^2 + 10x + 23$

(b) $f(x) = 3x^3 - 2x^2 + 75x - 50$



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