

Complex Zeros
Writing Functions

Your Name

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12/15/2020

Notes

Day 3

Creating Function given Real and Complex Roots

Subtract term, so that equation = 0

Remember Complex/Imaginary roots come in conjugate pairs. Real number roots do not.

ex. $x = \pm 3i, x = 2$

Tip: multiply conjugate factors together first

$$\begin{array}{r} x = 3i \\ -3i \quad -3i \\ \hline x - 3i = 0 \end{array} \quad \begin{array}{r} x = -3i \\ +3i \quad +3i \\ \hline x + 3i = 0 \end{array} \quad \begin{array}{r} x = 2 \\ -2 \quad -2 \\ \hline x - 2 = 0 \end{array}$$

$$(x - 3i)(x + 3i)(x - 2) = 0$$

$$(x^2 + 3ix - 3ix - 9i^2)(x - 2) = 0$$

$$(x^2 + 9)(x - 2) = 0$$

$$\boxed{x^3 - 2x^2 + 9x - 18 = 0}$$

ex. if the function has degree 3

and $x = 1/2$ and $x = 5 - 2i$ complex conjugate

$$\begin{array}{r} 2(x) = \left(\frac{1}{2}\right)^2 \\ 2x = 1 \\ -1 \quad -1 \\ \hline 2x - 1 = 0 \end{array} \quad \begin{array}{r} x = 5 - 2i \\ -5 \quad -5 \\ \hline x - 5 = -2i \\ +2i \quad +2i \\ \hline x - 5 + 2i = 0 \end{array} \quad \begin{array}{r} x = 5 + 2i \\ -5 \quad -5 \\ \hline x - 5 = 2i \\ -2i \quad -2i \\ \hline x - 5 - 2i = 0 \end{array}$$

$$(2x - 1)(x - 5 + 2i)(x - 5 - 2i) = 0$$

$$(2x - 1)(x^2 - 5x - 2ix - 5x + 25 + 10i + 2ix - 10i - 4i^2) = 0$$

$$(2x - 1)(x^2 - 10x + 29) = 0$$

Complex Terms cancel!

$$2x^3 - 20x^2 + 58x - x^2 + 10x - 29 = 0$$

$$\boxed{2x^3 - 21x^2 + 68x - 29 = 0}$$