3.3 Conjugate Zeros Theorem Day 4 (1)

If $z = a+bi$ is a zero of $f(x)$

then $\bar{z} = a-bi$ is also a zero of $f(x)$.

symbol for Conjugate

$\boxed{\text{Ex 5}}$ Find a polynomial function $f(x)$ of least degree having only real coefficients and zeros of 3 and $2+i$

There must also be a zero $2-i$

$f(x) = (x-3)[x-(2+i)][x-(2-i)]$

$f(x) = (x-3)\underbrace{(x-2-i)(x-2+i)}$

$(x-2-i)(x-2+i) = x^2 - 2x + \cancel{ix}$
$\quad - 2x \quad + 4 - 2\cancel{i}$
$\quad - \cancel{ix} \quad + 2\cancel{i} - i^2$

$= x^2 - 4x + 4 - i^2$

$= x^2 - 4x + 4 - (-1)$

$= x^2 - 4x + 4 + 1$

$= x^2 - 4x + 5$

$\boxed{f(x) = (x-3)(x^2-4x+5)}$

$f(x) = x^3 - 7x^2 + 17x - 15$

STOP

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