3.6: Complex Zeros, Fundamental Theorem of Algebra

Supplementary Notes

Any polynomial f with real coefficients and with degree $n \geq 1$ can be factored

$$f(x) = a(x - z_1)(x - z_2) \cdot \cdots \cdot (x - z_{n-1})(x - z_n)$$

where the coefficient a and zeros z_i, $i \leq i \leq n$, are real or complex. If $a + bi$ is a zero of f, then so is its conjugate $a - bi$.

Exercise

1. Select the polynomial with real coefficients of degree 5 and having zeros 1, $-2 + 4i$, $3 - i$.

   A. $(x - 1)(x - 2 + 4i)(x - 2 + 4i)(x + 3 - i)(x + 3 + i)$

   B. $(x - 1)(x + 2 + 4i)(x + 2 + 4i)(x + 3 - i)(x + 3 + i)$

   C. $(x - 1)(x + 2 + 4i)(x + 2 + 4i)(x - 3 - i)(x - 3 + i)$

   D. None of these

   E. $(x - 1)(x - 2 + 4i)(x - 2 + 4i)(x - 3 - i)(x - 3 + i)$