Answer on Question #69992 – Math – Algebra

Question

Write a polynomial function of minimum degree with real coefficients whose zeros include those listed. Write the polynomial in standard form.

8, -14, and 3 + 9i

Solution

The other needed zero is $3 - 9i$ because complex zeros come in conjugate pairs.

Function in a form other than general (here being factored) will be

$$p(x) = (x - 8)(x + 14)(x - (3 + 9i))(x - (3 - 9i))$$

To keep "real coefficients" one need a quadratic factor corresponding to the product of two complex factors with imaginary components.

$$(x - 3 - 9i)(x - 3 + 9i) = x^2 - 3x + 9ix - 3x + 9 - 27i - 9ix + 27i - 81i^2 =$$

$$= x^2 - 6x + 9 + 81 = x^2 - 6x + 90,$$

hence

$$p(x) = (x - 8)(x + 14)(x^2 - 6x + 90).$$

Finally the standard form of the polynomial is

$$p(x) = x^4 - 58x^2 + 1212x - 10080$$

Answer: $p(x) = x^4 - 58x^2 + 1212x - 10080.$