31 Polynomials with Complex Zeros

Due:
12/15/2015 at 06:00am EST.

Students will be able to:

- Use Fundamental Theorem of Algebra to recover a formula for a polynomial that has given real and complex zeros
- Find all roots of a polynomial with a possible hint of the possible zeros

Functions and symbols that WeBWorK understands.

Links to some useful WeBWorK pages for students

1. (1 pt) Given that $f(x)$ is a cubic function with zeros at -1 and $-3i-1$, find an equation for $f(x)$ given that $f(0)=-5$.

$f(x) =$ _____

2. (1 pt) Find a polynomial with integer coefficients, with leading coefficient 1, degree 5, zeros i and $1-i$, and passing through the origin.
$P(x) =$ _____

3. (1 pt) Find an equation for $f(x)$, the polynomial of smallest degree with real coefficients such that $f(x)$ bounces off of the x-axis at 4, bounces off of the x-axis at 3, has complex roots of $4-i$ and $1-5i$ and passes through the point $(0,-51)$.

$f(x) =$ _____.

4. (1 pt)
A degree 4 polynomial $P(x)$ with integer coefficients has zeros $3i$ and 2, with 2 being a zero of multiplicity 2. Moreover, the coefficient of x^4 is 1. Find the polynomial.

$P(x) =$ _____

5. (1 pt)

$$f(x) = x^4+8x^3-26x^2-248x+265$$

Given that $-7-2i$ is a root of $f(x)$, find all of the roots, giving real roots in increasing order, followed by complex roots with increasing imaginary parts.

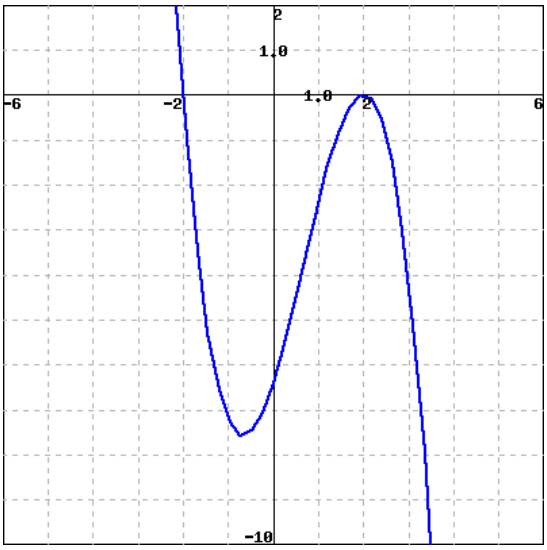
The roots are: _____, _____, _____, _____.

6. (1 pt) The polynomial

$$f(x) = 10x^3-3x^2+90x-27$$

has $3i$ as a root. Give all of the roots of f in a comma-separated list, including the given one.
Roots: _____

7. (1 pt)



To get a better look at the graph, you can click on it.
The curve above is the graph of a degree 3 polynomial. It goes through the point $(5,-50.4)$. Find the polynomial.
$f(x) =$ _____

8. (1 pt) Give all of the zeros of $P(x) = x^2+16$ as a comma separated list.

_____

9. (1 pt) A degree 4 polynomial with integer coefficients has zeros $-2-4i$ and 1, with 1 a zero of multiplicity 2. If the coefficient of x^4 is 1,
then the polynomial is _____.

10. (1 pt) Find a degree 3 polynomial with coefficient of x^3 equal to 1 and zeros -1, $-3i$ and $3i$.
Your answer is _____.

11. (1 pt) The zeros of $P(x) = x^3+9x$ are
$x_1 =$ _____ with multiplicity _____;
$x_2 =$ _____+_____ i with negative imaginary part,
its multiplicity is _____; and
$x_3 =$ _____+_____ i with positive imaginary part,
its multiplicity is _____.

12. (1 pt) The zeros of $P(x) = x^3+3x^2+4x+12$ are
$x_1 =$ _____ with multiplicity _____;
$x_2 =$ _____+_____ i with negative imaginary part,
its multiplicity is _____; and
$x_3 =$ _____+_____ i with positive imaginary part,
its multiplicity is _____.

13. (1 pt) The zeros of $P(x) = x^5+18x^3+81x$ are
$x_1 =$ _____ with multiplicity _____;
$x_2 =$ _____+_____ i with negative imaginary part,
its multiplicity is _____; and
$x_3 =$ _____+_____ i with positive imaginary part,
its multiplicity is _____.