Finding Complex Zeros and Writing Polynomials from all Zeros

Find all the zeros of f(x). Include any multiplicities greater than 1. Classify the roots as real or imaginary.

1. $f(x) = 2x^5 + 3x^3 - 5x$ 2. $f(x) = x^3 - 3x^2 + 4x - 12$

Solve the polynomial equation by finding all roots.

3. $2x^3 - 3x^2 + 8x - 12 = 0$ 4. $x^4 - 5x^3 + 3x^2 + x = 0$

5. Given the zero 2i find the remaining zeros for the polynomial $f(x) = x^4 - 16$

6. Given the zero -3i find the remaing zeros for the polynomial $f(x) = x^4 - 2x^3 + x^2 - 18x - 72$

Write the polynomial function in standard form with least degree and a leading coefficient of 1 that has the given zeros.

7. $0, \sqrt{5} and 2$

8. $4i, 2 and -2$

9. $1, -1(multiplicity 3), and 3i$

10. $2 and 3 - 2i$

11. **Critical Thinking** What is the least degree of a polynomial equation that has $3i$ as a root with a multiplicity of 3, and $2 - \sqrt{3}$ as a root with multiplicity 2? Explain.
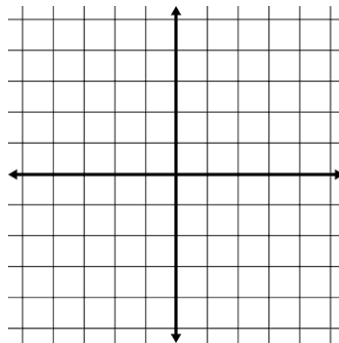
Review

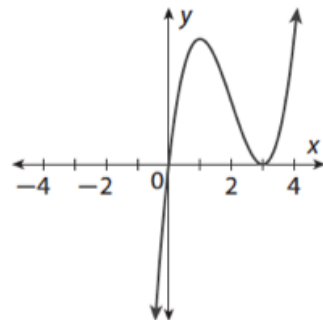1. Graph the following functions and state the domain, range, and end behavior

$f(x) = (x+2)^3 (x-1)^2$

Zeros and Multiplicity:

End Behavior:

2. Write a function for the following graph

Name: _____

Selected Answers:

1. $x = 2, x = \dfrac{2 \pm \sqrt{2}i}{3}$

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

4. $x = 0, x = 1, x = 2 \pm \sqrt{5}$

8. $f(x) = (x-3)^2 (x^2 + 9)$

14. $f(x) = (x^4 + 4)(x^2 - 2)(x + 3)$ should have been a 7th degree polynomial