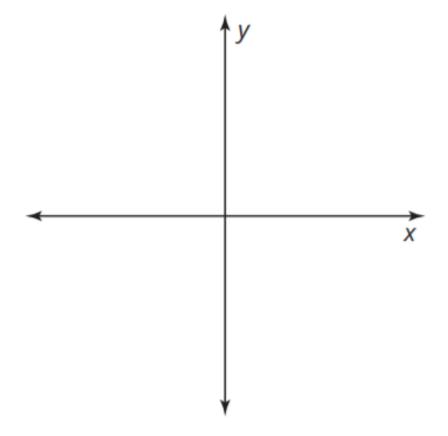$$f(x) = 2x^3 - 6x^2 + 4x$$

5. **Tony and Eva each attempt to factor $f(x) = x^3 - 2x^2 + 2x$. Analyze their work.**

Tony

First, I removed the GCF, x.

The expression x² - 2x + 2 cannot be factored, so f(x) = x(x² - 2x + 2).

Eva

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

$x^2 - 2x + 2 = 0$

$x = \dfrac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(2)}}{2(1)}$

$x = \dfrac{2 \pm \sqrt{-4}}{2}$

$x = \dfrac{2 \pm 2i}{2}$

$x = 1 \pm i$

The function in factored form is
$f(x) = (x)[x - (1 + i)][x - (1 - i)]$.

a. If you consider the set of real numbers, who's correct? If you consider the set of complex numbers, who's correct? Explain your reasoning.

Remember:

The set of complex numbers is the set of numbers that includes both real and imaginary numbers.

b. Use the Distributive Property to rewrite Eva's function to verify that the function in factored form is equivalent the original function in standard form.

c. Identify the zeros of the function $f(x)$.

6. Analyze each expression.

$x^2 + 4$	$x^2 - 4$	$x^2 + 2x + 5$	$x^2 + 4x - 5$
$-x^2 + x + 12$		$x^2 + 4x - 1$	$-x^2 + 6x - 25$

> Some functions can be factored over the set of real numbers. However, all functions can be factored over the set of complex numbers.

a. **Sort each expression based on whether it can be factored over the set of real numbers or over the set of imaginary numbers.**

Complex Factors	
Real Factors	Imaginary Factors

b. **Factor each expression over the set of complex numbers.**

Worked Example

You can use chunking to factor $9x^2 + 21x + 10$.

Notice that the first and second terms both contain the common factor $3x$.

$9x^2 + 21x + 10 = (3x)^2 + 7(3x) + 10$ Rewrite terms as a product of common factors.

$\qquad = z^2 + 7z + 10$ Let $z = 3x$.

$\qquad = (z + 5)(z + 2)$ Factor the quadratic.

$\qquad = (3x + 5)(3x + 2)$ Substitute $3x$ for z.

The factored form of $9x^2 + 21x + 10$ is $(3x + 5)(3x + 2)$.

1. **Use chunking to factor and identify the zeros of**
    $f(x) = 25x^2 + 20x - 21$**. Then sketch the polynomial.**