2.2 - Polynomial Division & The Remainder Theorem

Skills:

- Perform Polynomial Long Division
- Perform Synthetic Division
- Use the Remainder Theorem to evaluate expressions

Polynomial Long Division

This is (really) just like long division with integers from fourth grade...but different enough that it just needs to be demonstrated, not explained.
Here are several examples.

Example

$$\frac{6x^2 - 7x + 4}{2x + 1}$$

Example $\dfrac{2x^3 - 3x^2 - 2x}{2x - 3}$

Example

$$\frac{4x^2 - 3}{x + 5}$$

Synthetic Division

This only works when the divisor is of the form

$$x - c$$

Once again, I think it's better to just show you, rather than try to write out detailed instructions...

Example $\dfrac{x^2 - 5x + 4}{x - 1}$

Example

$$\frac{x^3 - 8x + 2}{x + 3}$$

The Remainder Theorem

The remainder of $\frac{f(x)}{x - c}$

is $f(c)$

...so you can use Synthetic Division to evaluate expressions!

Example $f(x) = x^4 - 5x^3 + x^2 - 5x$

$f(-1) = ?$

Example

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

$$f(2) = ?$$