Concept

Steps to Divide Polynomials Using Long Division

- 1. Set up the problem, adding zeros for missing terms in the dividend.
- 2. Divide the first terms in the divisor and dividend.
- 3. Multiply (distribute to the divisor).
- 4. Subtract (add the opposite of all terms) and combine.
- 5. Bring down the next term.
- 6. Repeat, as needed. (The remainder will have a degree less than the divisor.)
- 7. Write the quotient with any remainder as a ratio over the divisor.

$$(4x^3+3x+4)\div(2x-1)$$

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

$$2x^{2}(2x-1) + \frac{(4x^{3} + 0x^{2} + 3x + 4)}{2x^{2} + 3x}$$

$$x(2x-1) + \frac{(2x^{2} + 1x)}{2x^{2} + 1x}$$

$$x(2x-1) + \frac{(4x^{3} + 2x^{2})}{2x^{2} + 3x}$$

$$x(2x-1) + \frac{(4x^{3} + 2x^{2})}{2x^{2} + 1x}$$

$$x(2x-1) + \frac{(4x^{3} + 2x^{2})}{2x^{2} + 1x}$$

$$(2x^3 - 15x^2 + 18x - 15) \div (x - 5)$$
dividend

$$2x^{2} - 5x - 7 + \frac{-50}{x - 5}$$

$$x - 5 / 2x^{3} - |5x^{2} + |8x - 15|$$

$$+ (2x^{3} + 10x^{2}) \downarrow$$

$$-5x^{2}(x - 5) + (+5x^{2} + 25x)$$

$$-7x - 15$$

$$-7x - 15$$

$$+ (+7x + 35)$$

$$-50$$

$$(15x^{3}+8x-12) \div (3x^{2}+6x+1)$$
dividend
$$5x - 10 + \frac{63x-2}{3x^{2}+6x+1}$$

$$3x^{2}+6x+1 / 15x^{3} + 0x^{2} + 8x - 12$$

$$+ (15x^{3}+30x^{2}+5x) \downarrow$$

$$-30x^{2} + 3x - 12$$

$$+ (+30x^{2}+60x+10)$$

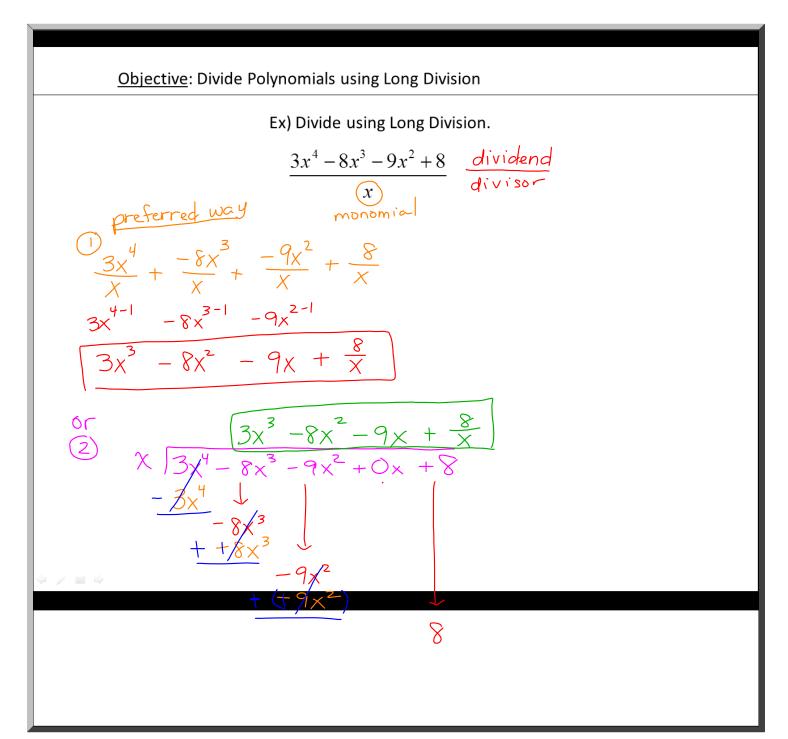
$$-3x^{2}+6x+1$$

$$-30x^{2}+60x+10)$$

$$-3x^{2}+6x+1$$

$$-30x^{2}+60x+10)$$

$$(9x^4 + x^3 + 140x^2 - 4) \div (x^2 + 16)$$
divisor



<u>Closure</u>

How can you tell if you are finished with a polynomial division problem?

The remainder has a degree less than the degree of the divisor, or has degree 0 (is a constant).