2.1: Dividing Polynomials → Long Division

* polynomial must be in standard form
* make sure all terms are represented → every exponent

Ex 1) $(m^2-7m-11)\div(m-8)$

Steps 1) divide 1st term by the 1st term
2) multiply
3) subtract "change, change"
4) bring down the next term
5) repeat

$$m-8\overline{)\,m^2-7m-11}$$

$$\frac{m^2}{m}=m \qquad m+1$$

$$-m^2+8m$$

$$\frac{m}{m}=1 \qquad m-11$$

$$-m+8$$

$$-3$$

$$m+1-\frac{3}{m-8}$$

Ex 2) $(13x^2+3x^3+2x-8)\div(3x-2)$

$(3x^3+13x^2+2x-8)\div(3x-2)$

$$3x-2\overline{)\,3x^3+13x^2+2x-8} \qquad x^2+5x+4$$

$$\frac{3x^3}{3x}=x^2$$

$$-3x^3+2x^2$$

$$\frac{15x^2}{3x}=5x$$

$$15x^2+2x$$

$$-15x^2+10x$$

$$\frac{12x}{3x}=4$$

$$12x-8$$

$$-12x+8$$

$$0$$

$$x^2+5x+4$$

* If remainder = 0, then divisor is a factor!

you try: $(x^2 - 2x - 15) \div (x-5)$

$x+3$

$x-5)\ x^2-2x-15$

$-x^2+5x$ ↓

$3x-15$

$-3x+15$

0

$\frac{x^2}{x} = x$

$\frac{3x}{x} = 3$

$x+3$

Ex 3) $\frac{x^4-6x^2-27}{x+2}$ → $(x^4+0x^3-6x^2+0x-27) \div (x+2)$

x^3-2x^2-2x+4

$x+2)\ x^4+0x^3-6x^2+0x-27$

$-x^4+2x^3$ ↓

$-2x^3-6x^2$

$+2x^3+4x^2$

$-2x^2+0x$

$+2x^2+4x$

$4x-27$

$-4x+8$

-35

$\frac{x^4}{x} = x^3$

$\frac{-2x^3}{1x} = -2x^2$

$\frac{-2x^2}{1x} = -2x$

$\frac{4x}{x} = 4$

$x^3-2x^2-2x+4-\frac{35}{x+2}$