Spiral Review #4.1

Key

1. Express in simplest form:

   a. $\dfrac{x^2-5x-14}{x^2+x-2} = \dfrac{(x-7)(x+2)}{(x+2)(x-1)} = \dfrac{x-7}{x-1}$

   b. $\dfrac{x^2-8x+7}{7x-x^2} = \dfrac{(x-7)(x-1)}{x(7-x)} = \dfrac{-1(x-1)}{x}$

   Factor

2. Determine if $(x-2)$ is a factor of $3x^3-4x+2$. Explain your answer.

   ROOT → $x=2$ $3(2)^3-4(2)+2 \overset{?}{=} 0$ $18 \neq 0$

   $2 \overline{)\,\begin{array}{cccc} 3 & 0 & -4 & 2 \\ \downarrow & 6 & 12 & 16 \\ \hline 3 & 6 & 8 & \boxed{18} \end{array}}$ remainder

   NO $(x-2)$ is NOT a factor because there is a remainder when you divide.

3. Determine the quotient and remainder of $\dfrac{2x^3+2x+9}{2x+4}$. must use LONG Division!

   $$2x+4 \,\overline{)\,\begin{array}{l} x^2 \;\; -2x \;+\;5 \\ 2x^3 +0x^2 +2x +9 \end{array}}$$
   $-2x^3 +4x^2$
   $\quad -4x^2 +2x$
   $\quad +4x^2 +8x$
   $\qquad\qquad 10x+9$
   $\qquad\qquad -10x+20$
   $\qquad\qquad\qquad -11 →$ Remainder

   $x^2-2x+5-\dfrac{11}{2x+4}$

   $\underbrace{x^2-2x+5}_{\text{Quotient}}$

4. Sketch a function that has the following characteristics:

   a. 4 real zeros
   b. As $x \to \infty, f(x) \to \infty$
   c. As $x \to -\infty, f(x) \to \infty$

   cross x-axis 4 times

   as $x \to -\infty$ $f(x) \to \infty$

   as $x \to \infty$ $f(x) \to \infty$
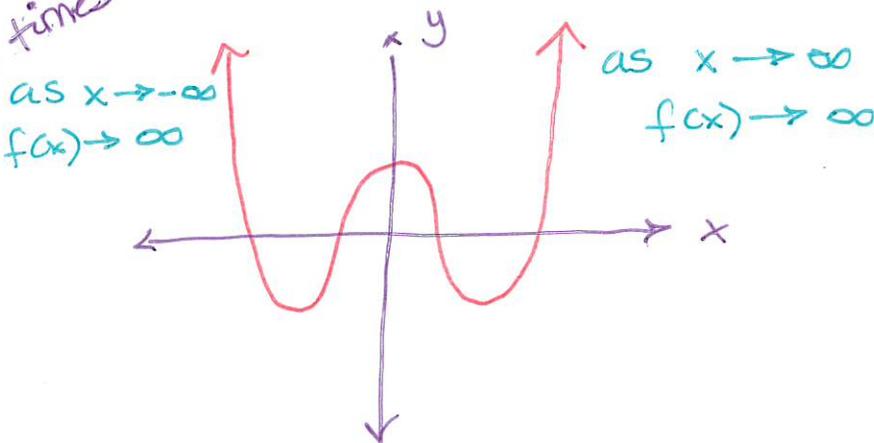
5. Given the graph to the right,
   a. Determine all roots of the function.

   $x = -3 \qquad x = -1 \qquad x = 2$

   b. List all factors of the function.

   $(x+3) \quad (x+1) \quad (x-2)$

   c. Write a possible equation for this function in standard form.

   $y = \boxed{-1(x+3)}\boxed{(x+1)(x-2)}$

   $(-x-3)(x^2-x-2)$

   $-x^3 + x^2 + 2x$
   $\underline{-3x^2 + 3x + 6}$

*a
○—
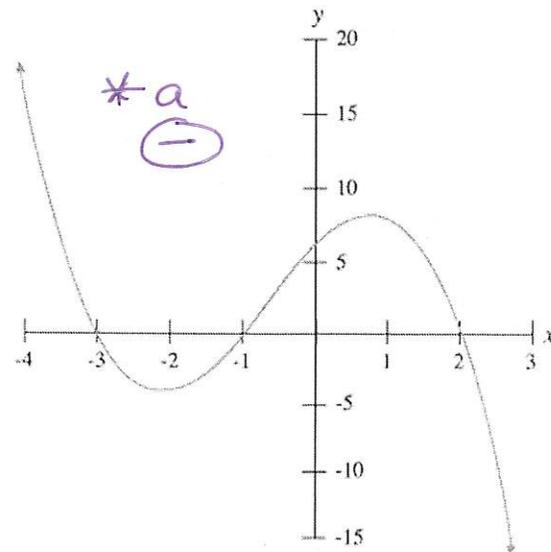
$y = -x^3 - 2x^2 + 5x + 6$

6. Given the graph of $f(x) = x^3 + 6x^2 + 13x + 12$,
   a. Write the function as a product of its linear and quadratic factor.

   Linear Factor: $(x+3)$

   b. ~~Find the 2 complex~~

$\begin{array}{r|rrrr} -3 & 1 & 6 & 13 & 12 \\ & \downarrow & -3 & -9 & -12 \\ \hline & 1 & 3 & 4 & 0 \end{array}$
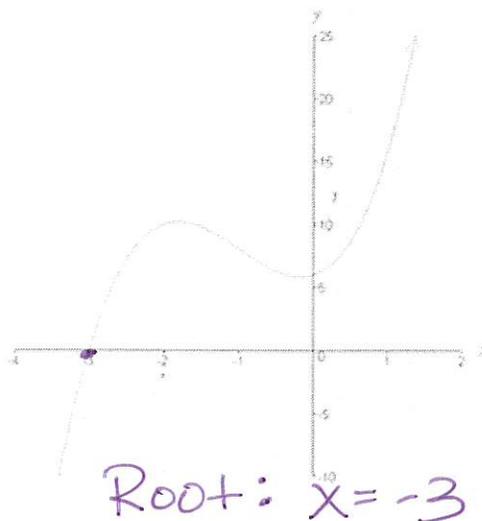
Root: $x = -3$

Quadratic Factor: $1x^2 + 3x + 4$

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