Using the procedure in the Rational Function Graphing Handout posted on my website on Thu May 31, graph the following function. You must show **ALL STEPS & ALL WORK**.

SCORE: _____ / 6 PTS

Show all relevant features on your final graph (ie. your graph should not resemble a graphing calculator's graph.)

For step [6], you must calculate **EXACTLY** what functions $f(x)$ resembles at each $x-$ intercept and vertical asymptote, including finding the **EXACT** formulae (**DO NOT** use the k shorthand shown in lecture) and drawing the small pieces of graph next to those formulae. (Refer to the examples in the handout.)

$$f(x) = \frac{2x^2+2x}{x^3+x^2-12x} = \frac{2x(x+1)}{x(x+4)(x-3)}$$

STEP [1] $x(x+4)(x-3) \neq 0$

DOMAIN $= \{x \neq 0$ AND $x \neq -4$ AND $x \neq 3\}$

STEP [2] $2x(x+1)=0$

$x=0$ OR $x=-1$

↑ NOT IN DOMAIN

X-INT $= (-1,0)$

STEP [3] $f(0)$ DOES NOT EXIST

NO y-INT

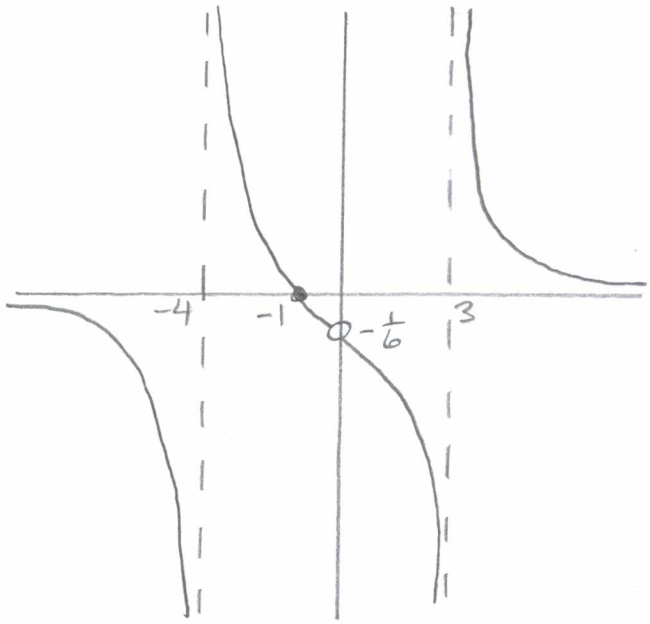
STEP [4] DEGREE OF NUMERATOR < DEGREE OF DENOMINATOR

AS $x \to \pm\infty$, $y \to 0$

HORIZONTAL ASYMPTOTE

$y=0$

GRAPH



STEP [5] SIMPLIFIED $f(x) = \frac{2(x+1)}{(x+4)(x-3)}$ $(x+4)(x-3)=0$

$x=-4$ AND $x=3$

VERTICAL ASYMPTOTES

HOLE AT $x=0$, $y = \frac{2(0+1)}{(0+4)(0-3)} = -\frac{1}{6}$

STEP [6]

AT $x=-1$, $f(x) \approx \frac{2(x+1)}{(-1+4)(-1-3)} = -\frac{1}{6}(x+1)$ —

AT $x=-4$, $f(x) \approx \frac{2(-4+1)}{(x+4)(-4-3)} = \frac{6}{7(x+4)}$ ||

AT $x=3$, $f(x) \approx \frac{2(3+1)}{(3+4)(x-3)} = \frac{8}{7(x-3)}$ ||

Using the procedure in the Rational Function Graphing Handout posted on my website on Thu May 31, graph the following function. You must show **ALL STEPS & ALL WORK**.

SCORE: _____ / 10 PTS

Show all relevant features on your final graph (ie. your graph should not resemble a graphing calculator's graph.)

For step [6], you must calculate **EXACTLY** what functions $f(x)$ resembles at each $x-$intercept and vertical asymptote, including finding the **EXACT** formulae (**DO NOT** use the k shorthand shown in lecture) and drawing the small pieces of graph next to those formulae. (Refer to the examples in the handout.)

$$f(x)=\frac{(x-1)(x+2)(x-3)}{(x+6)^2}$$

STEP [1] $(x+6)^2\neq 0$

DOMAIN $=\{x\neq -6\}$

STEP [2] $(x-1)(x+2)(x-3)=0$

$x=1$ OR $x=-2$ OR $x=3$

x-INT $=(1,0),(-2,0),(3,0)$

STEP [3] $f(0)=\frac{(-1)(2)(-3)}{6^2}=\frac{1}{6}$

y-INT $=(0,\frac{1}{6})$

STEP [4] DEGREE OF NUMERATOR $=1+$ DEGREE OF DENOMINATOR

$(x-1)(x+2)(x-3)=x^3-2x^2-5x+6$

$$\begin{array}{r} x-14 \\ x^2+12x+36\overline{)\,x^3-2x^2-5x+6} \\ x^3+12x^2+36x \\ \hline -14x^2-41x+6 \\ -14x^2-168x-504 \\ \hline 127x+510 \end{array}$$

SLANT ASYMPTOTE $y=x-14$

STEP [5] $(x+6)^2=0$

$x=-6$ VERTICAL ASYMPTOTE

NO HOLES

STEP [6]

AT $x=1$, $f(x)\approx\frac{(x-1)(1+2)(1-3)}{(1+6)^2}=-\frac{6}{49}(x-1)$

AT $x=-2$, $f(x)\approx\frac{(-2-1)(x+2)(-2-3)}{(-2+6)^2}=\frac{15}{16}(x+2)$

AT $x=3$, $f(x)\approx\frac{(3-1)(3+2)(x-3)}{(3+6)^2}=\frac{10}{81}(x-3)$

AT $x=-6$, $f(x)\approx\frac{(-6-1)(-6+2)(-6-3)}{(x+6)^2}=\frac{-252}{(x+6)^2}$

GRAPH