Name _DiMarco_____

Directions: Read each question carefully. Show appropriate supporting work where necessary to receive full credit.

NO CALCULATOR!

1) Solve the equation. SHOW WORK!

$$\left[\frac{x}{x+2}+\frac{5}{x-3}=\frac{25}{x^2-x-6}\right]$$

$\frac{(x+2)(x-3)}$ LCD $\frac{X \neq -2, 3}{(X+2)(X-3)}$

$x(x-3)+5(x+2)=25$

$x^2-3x+5x+10=25$

$x^2+2x-15=0$

$(x-3)(x+5)$

$x=3, \boxed{-5}$

2) For the function $f(x)=\dfrac{x-2}{x^2-2x-3}$, find all asymptotes and intercepts. SHOW appropriate supporting work! Then graph it and write the end behavior limits.

$f(x)=\dfrac{x-2}{(x+1)(x-3)}$

VA: $x=-1, x=3$

HA: $y=0$ $\frac{sm}{big}$

X-int $(2,0)$

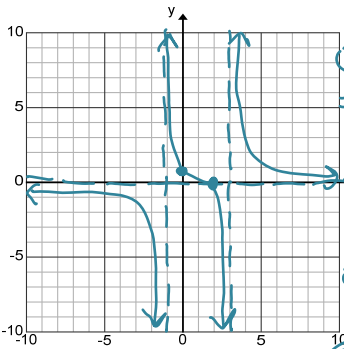y-int $(0, \frac{2}{3})$

$\overset{-1}{\underset{=}{\odot}} \lim_{x\to-1^-} f(x) = -\infty$

$\overset{-.9}{\underset{+}{\odot}} \lim_{x\to-1^+} f(x) = \infty$

$\overset{2.9}{\underset{\pm}{\odot}} \lim_{x\to3^-} f(x) = -\infty$

$\overset{3.1}{\underset{+}{\odot}} \lim_{x\to3^+} f(x) = \infty$

End behavior:

$\lim_{x\to\infty} f(x) = 0$ $\lim_{x\to-\infty} f(x) = 0$

3) For the function $h(x)=\dfrac{x^2+4x-5}{x+3}$, find all asymptotes and intercepts. SHOW appropriate supporting work! Then graph it and write the end behavior limits.

$h(x)=\dfrac{(x-1)(x+5)}{x+3}$

VA $x=-3$

HA No: Slant Asymptote

$\begin{array}{c|ccc} -3 & 1 & 4 & -5 \\ + & & -3 & -3 \\ \hline & 1 & 1 & -8 \end{array}$
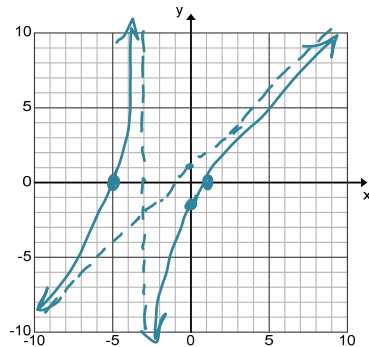
$\boxed{y=x+1}$

X-int $(1,0) (-5,0)$

y-int $(0, -\frac{5}{3})$

End behavior

$\lim_{x\to\infty} f(x) = x+1 = \infty$

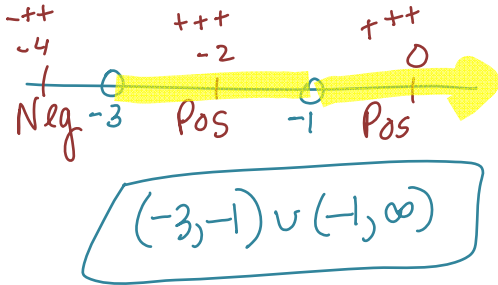$\lim_{x\to-\infty} f(x) = x+1 = -\infty$

4) Solve the inequality using a sign chart.

$\overset{+}{}\overset{+}{}$

$(x+3)(x^2+4)(x+1)^2>0$ Non-Real

Zeros $x=-3,-1$

$\overset{-++}{-4}\qquad\overset{+++}{-2}\qquad\overset{+++}{0}$

Neg -3 Pos -1 Pos

$\boxed{(-3,-1)\cup(-1,\infty)}$

5) Solve the inequality using a sign chart.

Dom

$\dfrac{\sqrt{x+5}}{x-3}\le 0$ $[-5,\infty)$

zero $x=-5$
und $x=3$

$\overset{\pm}{0}\qquad\qquad\overset{\pm}{4}$
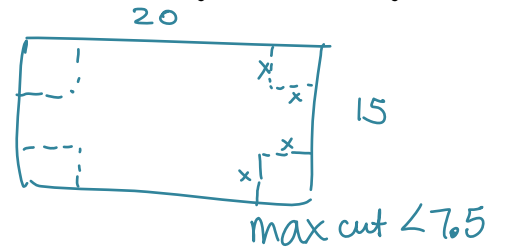
Neg 3 Pos

$\boxed{[-5,3)}$
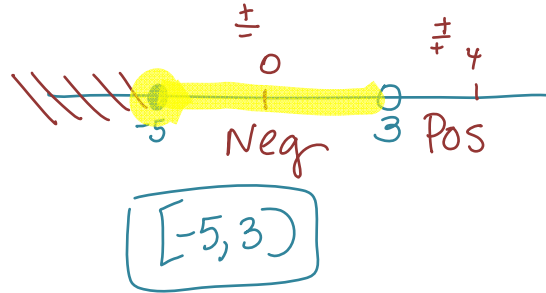
CALCULATOR OK!

6) A box is to be built out of a rectangular sheet of cardboard with dimensions 15 by 20 inches, by cutting squares out of each corner of the cardboard with length x.

20

15

max cut <7.5

A) Write an equation that models the volume of the box.

$V = x(15-2x)(20-2x) = Y_1$

B) What values of x (the cut) will give a box with a volume of at least 150 cubic inches?

$Y_2=150$

$x=.57, 5.94, \cancel{10.48}$

$\boxed{[.57,5.94]}$