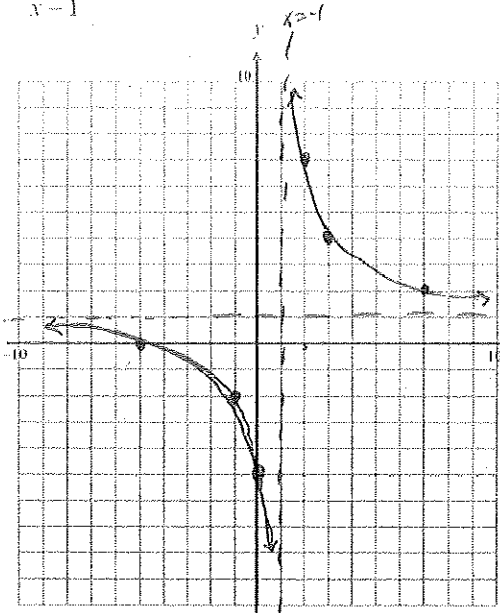


For each function find the following (if they exist).

- All asymptotes (vertical, horizontal, and slant) ... BE SURE TO WRITE THEM AS AN EQUATION
- Holes
- Intercepts (x and y)
- Sketch the graph without a calculator. Identify at least 3 plotted points per region

1.  $f(x) = \frac{x+5}{x-1}$

$\sqrt{VA} x=1$   
 $\sqrt{HA} y=1$   
 $\sqrt{x\text{-int}}: 0 = \frac{x+5}{x-1}$   
 $0 = x+5$   
 $-5 = x$   
 $\sqrt{y\text{-int}}: y = \frac{0+5}{0-1}$   
 $y = -5$

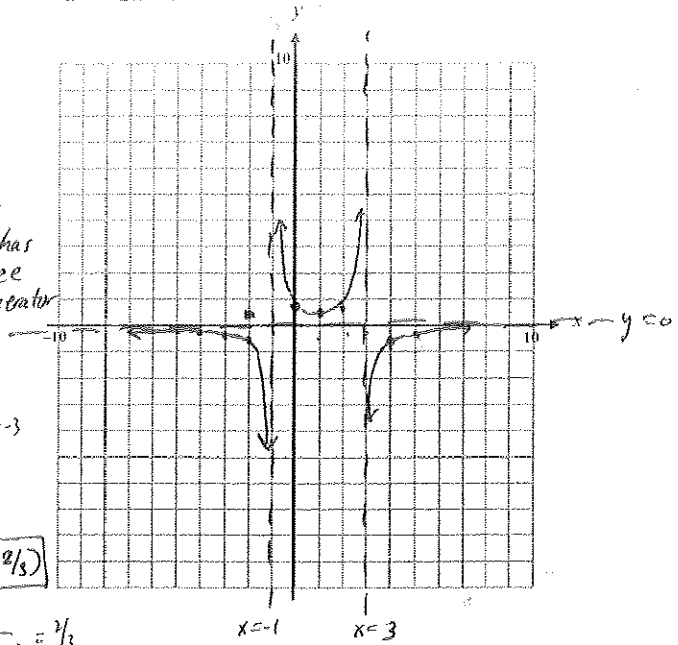


x	y
-1	-2
2	-2

x	y
2	7
3	4
7	2

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

$\sqrt{VA} x=3, x=-1$   
 $\sqrt{HA} y=0$   
 denominator has higher degree than numerator  
 $\sqrt{x\text{-int}}: 0 = \frac{-2}{x^2-2x-3}$   
 $0 \neq -2$   
 no x-int  
 $\sqrt{y\text{-int}}: (0, 2/3)$   
 $y = \frac{-2}{0-0-3} = 2/3$



x	y
-2	-4
-3	-1/6
-5	-1/6

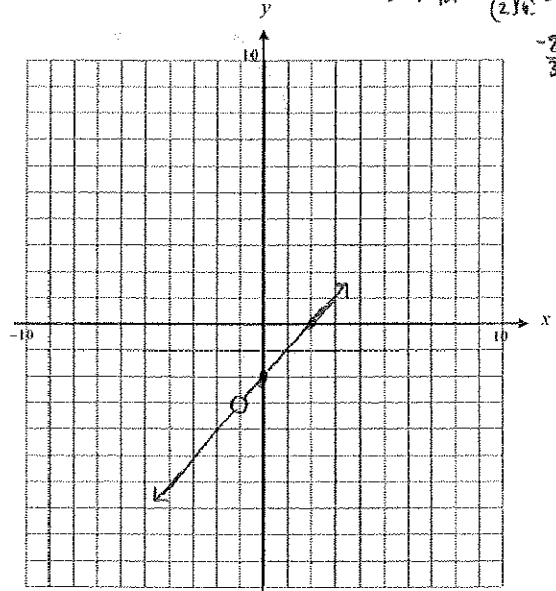
x	y
1	2/3
2	2/3
3	2/3
4	-2/3
5	-1/6
6	-1/6

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

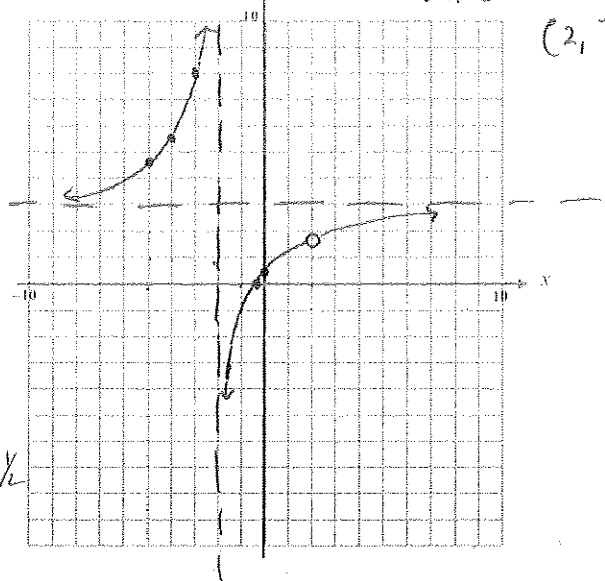
HOLE when  $x = -1$   
 $(-1, -3)$   
 Plug  $x = -1$  into  $x-2$   
 Graph this! (But with a hole!)

NO HA  
 NO VA

$y\text{-int}: -2 \rightarrow (0, -2)$   
 $x\text{-int}: 2 \rightarrow (2, 0)$



4.  $f(x) = \frac{3x^2 - 5x - 2}{x^2 - 4} = \frac{(3x+1)(x-2)}{(x+2)(x-2)} = \frac{3x+1}{x+2}$   
 Hole when  $x=2$

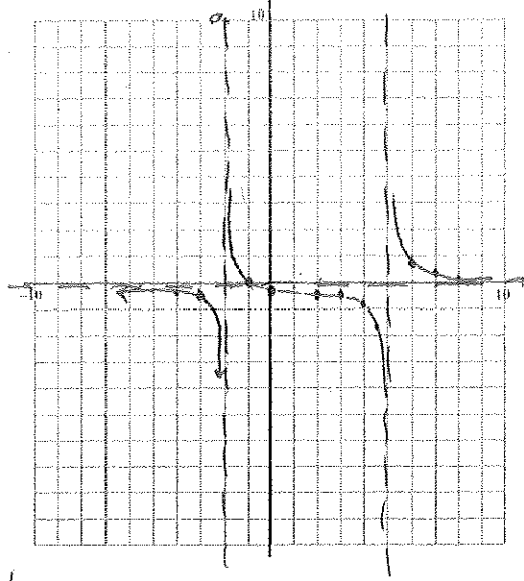


VA  $x = -2$   
 HA  $y = 3$   
 x-int:  $0 = 3x+1$   
 $-\frac{1}{3} = x$   
 $(-\frac{1}{3}, 0)$   
 y-int:  $y = \frac{3(0)+1}{0+2} = \frac{1}{2}$

x	y
-3	8
-4	5.5
-5	

$\frac{-9+1}{-1} = \frac{-8}{-1} = 8$   
 $\frac{-12+1}{-2} = \frac{-11}{-2} = 5.5$   
 $\frac{-15+1}{-3} = \frac{-14}{-3} = 4\frac{2}{3}$

5.  $f(x) = \frac{x+1}{x^2 - 3x - 10} = \frac{x+1}{(x-5)(x+2)}$

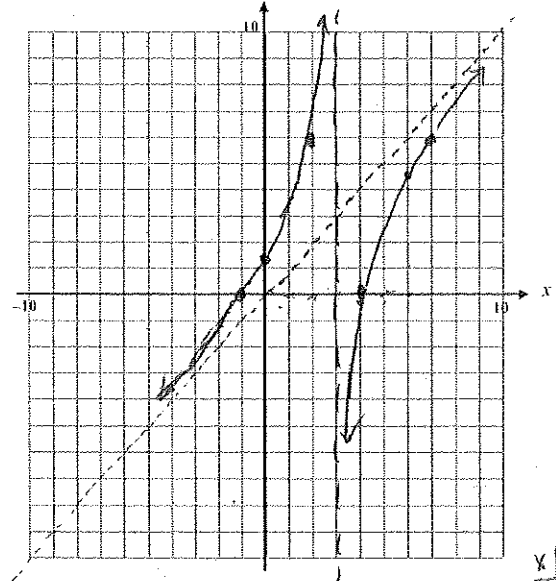


VA  $x = 5$   
 $x = -2$   
 HA  $y = 0$   
 x-int:  $0 = x+1$   
 $-1 = x$   
 $(-1, 0)$   
 y-int:  $y = \frac{0+1}{0^2-3(0)-10} = \frac{1}{-10}$

x	y
3	-4
2	-1
4	-5/6
5	-1/6

$\frac{-1}{(-3)(-1)} = \frac{1}{-4}$   
 $\frac{4}{(-2)(5)} = \frac{4}{-10}$   
 $\frac{3}{(2)(3)} = \frac{3}{6}$   
 $\frac{5}{(-1)(6)} = -\frac{5}{6}$   
 $\frac{4.5}{(1)(-0.5)} = -9$

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



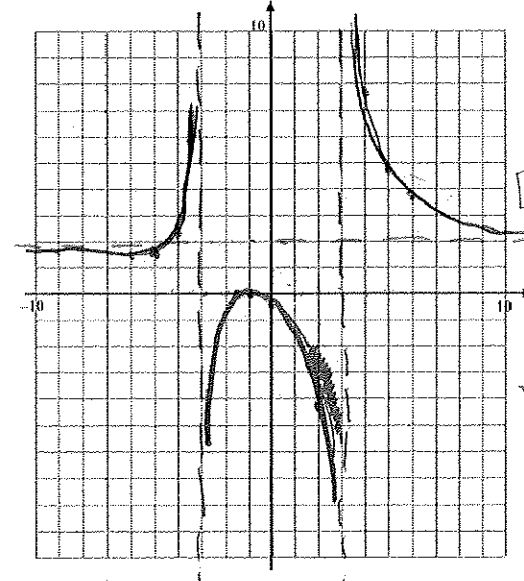
VA  $x = 3$   
 HA none  
 Start (see below)  
 $y = x$   
 x-int:  $(4, 0)$   
 $(-1, 0)$   
 y-int:  $y = \frac{0^2 - 3(0) - 4}{0 - 3} = \frac{-4}{-3} = \frac{4}{3}$   
 $(0, \frac{4}{3})$

x	y
2	1/3
6	2/3
7	6/4

$\frac{-4}{-1} = \frac{4}{1}$   
 $\frac{(2)(4)}{3}$   
 $\frac{(3)(6)}{4}$

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

7.  $f(x) = \frac{2x^2 + 5x + 3}{x^2 - 9} = \frac{(2x+3)(x+1)}{y(x+3)(x-3)}$



VA  $x = 3$   
 $x = -3$   
 HA  $y = 2$   
 x-int:  $0 = (2x+3)(x+1)$   
 $x = -3/2$   
 $x = -1$   
 y-int:  $y = \frac{3}{-9} = -\frac{1}{3}$

x	y
-4	2/7
-5	7/8
-6	1/6

$\frac{(2)(3)}{(-1)(-1)} = \frac{6}{1}$   
 $\frac{(7)(3)}{(-1)(-1)} = \frac{21}{1} = 21$   
 $\frac{(3)(3)}{(-1)(-1)} = \frac{9}{1}$   
 $\frac{(5)(1)}{(-1)(-1)} = \frac{5}{1} = 5$   
 $\frac{(7)(1)}{(-1)(-1)} = \frac{7}{1} = 7$   
 $\frac{(3)(1)}{(-1)(-1)} = \frac{3}{1} = 3$