

Math Worksheet: Graphs of Rational Functions(1)

Given the function

$$f(x) = \frac{2x^2 - 8}{x^2 + 2x - 3}$$

1. Find the domain f .

Denominator: $x^2 + 2x - 3 = 0 \Rightarrow (x-1)(x+3) = 0$

Domain all real numbers except 1 and -3
 or $(-\infty, -3) \cup (-3, 1) \cup (1, +\infty)$.

2. Find the horizontal and vertical asymptote of the graph of f .

H. Asymptote $y = \frac{2x^2}{x^2} = \underline{2}$.

V. Asymptotes $x = 1$ and $x = -3$

3. Find the y-intercept and x intercept, if any, of the graph of f .

y-intercept: $x = 0$; $f(0) = \frac{-8}{-3} = 8/3$. $(0, 8/3)$

x-intercepts: $\frac{2x^2 - 8}{x^2 + 2x - 3} = 0 \Rightarrow 2x^2 - 8 = 0$
 $\Rightarrow x = \pm 2$
 $(2, 0)$ and $(-2, 0)$

4. For what values of x is $f(x)$ positive?

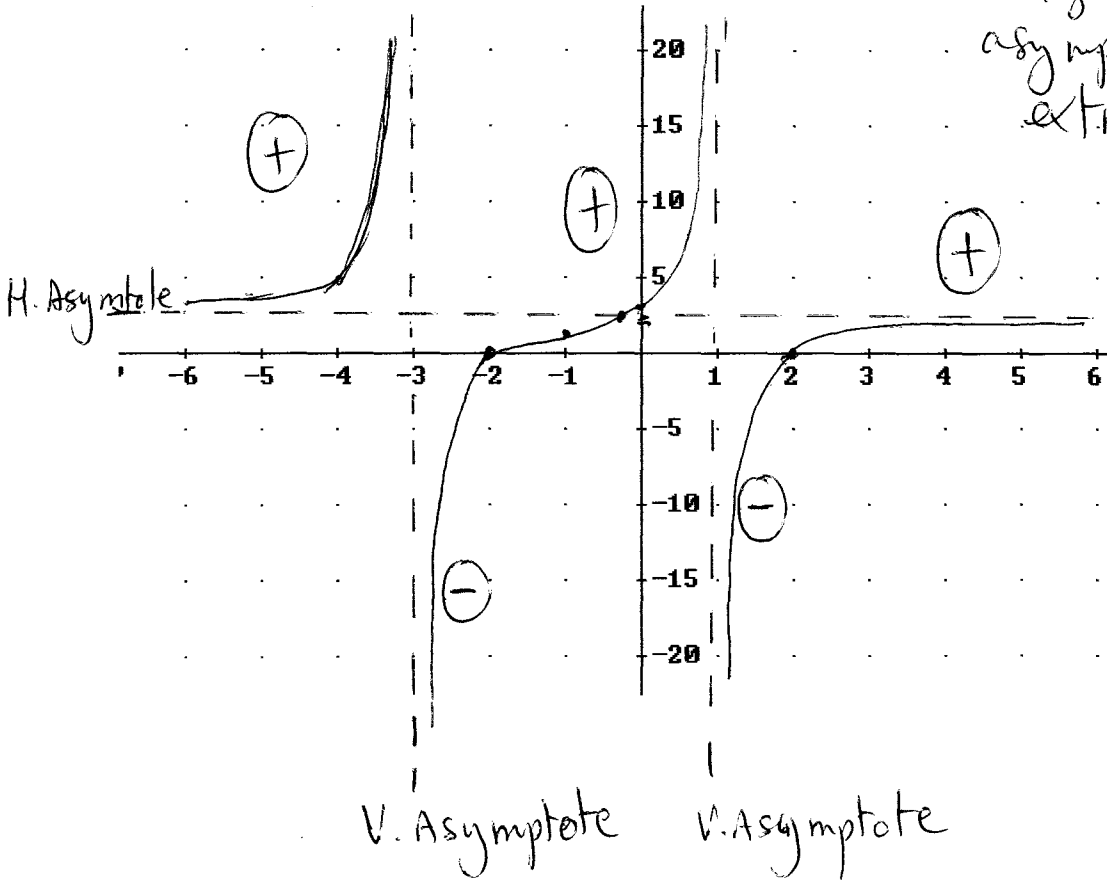
$$f(x) = \frac{2(x-2)(x+2)}{(x-1)(x+3)}$$

table of signs

		-3		-2		1		2	
$x+3$	-		+		+		+		+
$x+2$	-		-		+		+		+
$x-1$	-		-		-		+		+
$x-2$	-		-		-		-		+
$f(x)$	+		-	○	+		-	○	+
			V. Asymptote				V. Asymptote		

5. Sketch the graph of f .

Use table of sign, vertical and horizontal asymptote + extra points to graph.



more points.

x	$f(x)$
-4	4.8
-1	1.5
0	$8/3 \approx 2.7$
3	$5/6 \approx 0.8$
4	$26/21 \approx 1.2$