

Hint: All critical and inflection points are Integers.

MATH 135: Quiz 9

November 4, 2014

10

Name: Solutions Sec: \_\_\_\_\_

Fill in the following table and use it to sketch the graph of the function  $f(x)$  below.

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

For each row in the table, list the interval(s) or point(s) where  $f$  has the given property. If none exist, write "none". The axes for the sketch are on the back of this page.

Roots ( $f(x) = 0$ )	$x = 2, x = -2$	(1)
Increasing	$(2, \infty)$	(1)
Decreasing	$(-\infty, 0) \cup (0, 2)$	(1)
Concave Up	$(-\infty, -2) \cup (0, \infty)$	(1)
Concave Down	$(-2, 0)$	(1)
Critical Points	$x = 2$ (Minimum)	(1)
Inflection Points	$x = -2$	(1)
Horizontal Asymptotes	None	(1)
Vertical Asymptotes	$x = 0$	(1)

A, B do not factor, so by the hint they are never 0.

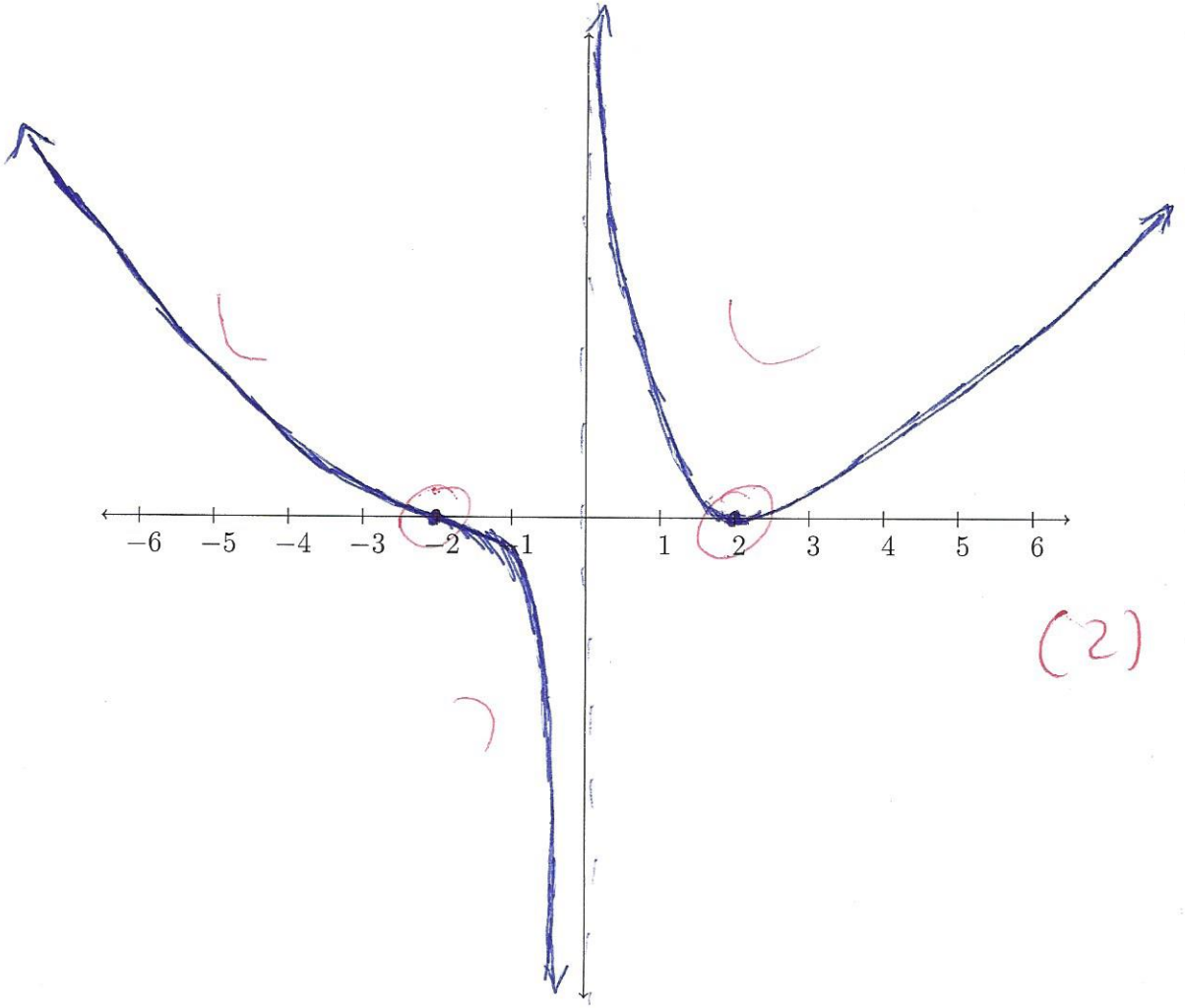
By plugging in 0, we see that  $A > 0, B > 0$  for all  $x$

→ You can also plug in points to check this in each case

$f$   $\leftarrow \frac{(-1)(-1)^2}{(-1)} = + \quad \frac{(+1)(-1)^2}{(+1)} = - \quad + \quad + \rightarrow$ 
or  $\lim_{x \rightarrow 0^-} \frac{(x+2)(x-2)^2}{x} = -\infty$  (1)

$f'$   $\leftarrow - \quad - \quad + \rightarrow$ 
 $\lim_{x \rightarrow 0^+} \frac{(x+2)(x-2)^2}{x} = +\infty$  (1)

$f''$   $\leftarrow + \quad - \quad + \rightarrow$ 
(1)



Actual Graph:

Asymptote

