

231 Quiz <sup>4</sup> 3

December 4, 2013

Name: \_\_\_\_\_

Name: *\* key \**

Name: \_\_\_\_\_

Work in groups. You must do all problems together, discussing and agreeing on each answer; do not split up the work. Hand in one copy of the quiz with a very clear, concise writeup. You may use your Notebooks.

1. Use every tool and method at your disposal to make a labeled, detailed graph of the function below. Include the locations of all roots, holes, extrema, and inflection points as well as the explicit equations of any asymptotes, including any slant or curve asymptotes. Also include clearly labeled sign charts for  $f$ ,  $f'$ , and  $f''$ .

So v.a. at  $x=2$  and h.a. none will have curve asy. of deg. 2 roots at  $x=1, 3$

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

poss. roots  $\pm 1, \pm 3$ ?  
 $1^3 - 5 \cdot 1^2 + 7 \cdot 1 - 3 = 0 \checkmark$   
 so  $x=1$  is a root.

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

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

1	-5	7	-3
1		1	-4
1	-4	3	0

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equation of curve asy:  $2 \begin{array}{r|rrrr} & 1 & -5 & 7 & -3 \\ & & 2 & -6 & 2 \\ \hline & 1 & -3 & 1 & -4 \end{array} \Rightarrow f(x) = (x^2 - 3x + 1) - \frac{1}{x-2}$   
 this is the curve asy  
 roots  $\frac{3 \pm \sqrt{9-4}}{2}$   
 $\hookrightarrow = \frac{3 \pm \sqrt{5}}{2}$

$$f'(x) = \frac{(3x^2 - 10x + 7)(x-2) - (x^3 - 5x^2 + 7x - 3)(1)}{(x-2)^2}$$

$$= \frac{2x^3 - 11x^2 + 20x - 11}{(x-2)^2}$$

poss. roots  $\pm 1, \pm 11 \dots$   $2 \cdot -11 + 20 - 11 = 0$  so  $x=1$  is a root!

2	-11	20	-11
2		-9	11
2	-9	11	0

$b^2 - 4ac = 81 - 4 \cdot 11 \cdot 2 < 0$   
 so this is invad.

and  $f(1) = \dots = 0!$

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$$f''(x) = \frac{(6x^2 - 22x + 20)(x-2)^2 - (2x^3 - 11x^2 + 20x - 11)(2(x-2)^1)}{(x-2)^4}$$

$\hookrightarrow = \dots = \text{no time!}$

\* graph on p.2 \*

no time  $\therefore$

$\longleftarrow f$   
 $\longleftarrow f''$

~~Vertical asymptote~~

f''/f'

+/- at VA

min /

curve of eqn

VA 2

roots 1, 3

curvasy E/nob

~~demon x-2~~

f''

-/+

min -

1, 3 eqn x<sup>2</sup>+x-2

VA 1

roots -1, 2

E

~~demon x-1~~

f''/f'

-/+

max /

-x<sup>2</sup>+3x

VA 3

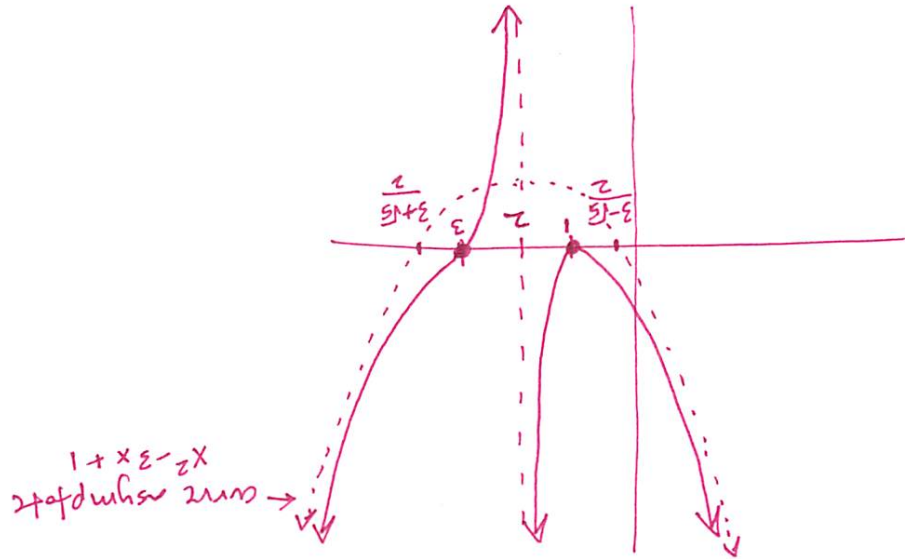
roots 1, 3

E

~~demon x-3~~

$$\lim_{x \rightarrow 2^+} f(x) \rightarrow -\infty$$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} \frac{x^3 - 5x^2 + 7x - 3}{x - 2} \rightarrow \infty$$



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