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NAME (1 pt)

SAMPLE TEST, worth 100 points, Chapter 5

Show all work that leads to your answers. Good luck!

15 pts

Using the information that the first and second derivatives give, completely graph the function  $P(x) = x^3 - 3x + 2$  in the space provided below. Clearly label any critical points, inflection points,  $x$  and  $y$ -axis intercept(s).

12 pts

TRUE or FALSE. Circle the correct response. (3 points each)

- T    F    If  $(c, f(c))$  is a critical point for  $f$ , then it is a local max or min.
- T    F    If  $f'(c) = 0$  and  $f''(c) > 0$ , then the point  $(c, f(c))$  is a local min.
- T    F    The second derivative of a function  $f$  tells us about the concavity of  $f$ .
- T    F    Suppose that  $(c, f(c))$  is a critical point for  $f$ . If  $f'(x) > 0$  to the left of  $c$ , and  $f'(x) < 0$  to the right of  $c$ , then  $(c, f(c))$  is a local maximum for  $f$ .

18 pts

(4 pts) True or False: If a function  $f$  is continuous and nonzero on an interval  $I$ , then it must be either positive or negative on this interval. \_\_\_\_\_

(6 pts) Find where the function  $f(x) = \frac{x(x-2)}{x+3}$  is positive and negative. (Hint: Draw a number line labeled 'Sign of  $f(x)$ '.)

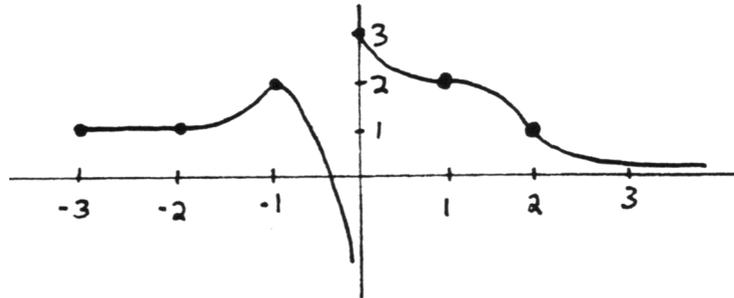
(8 pts) Find the open intervals on which  $f$  increases and decreases.

15 pts

Give a precise definition of  $\lim_{x \rightarrow \infty} f(x) = L$ . Make a sketch that illustrates the definition.

20 pts

The graph of a function  $f$  is shown below. Read the following information off the graph. Approximate where necessary. If a particular item does not exist, so state.



- (1 ea)  $f(-2.5)$        $f'(-2.5)$        $f'(1)$        $\lim_{x \rightarrow -1} f(x)$
- (2 pts) open interval(s) where  $f$  increases: \_\_\_\_\_
- (2 pts) open interval(s) where  $f'$  is negative: \_\_\_\_\_
- (2 pts) open interval(s) where  $f$  is concave down: \_\_\_\_\_
- (2 pts) open interval(s) where  $f''$  is positive: \_\_\_\_\_
- (2 pts) all local maximum point(s) for  $f$ : \_\_\_\_\_
- (2 pts) all inflection point(s) for  $f$ : \_\_\_\_\_
- (2 pts) all global maximum point(s) for  $f$ : \_\_\_\_\_
- (2 pts) List all the critical points for  $f$ : \_\_\_\_\_

20 pts

Completely graph  $f(x) = \frac{x + 1}{x - 1}$  in the space provided below. Clearly label all asymptotes.