

Name Solutions
 UID.....

Math 1210-3
 Quiz 8
 March 28, 2008

Show all work for complete credit!

Choose ONE of the two following functions to graph - your choice, the rational function on the front, or the polynomial on the back. If you try both, INDICATE CLEARLY which one you want graded. (On an exam, you would not have a choice, so should be prepared for either variety.)

1) Let $f(x) = \frac{x^2+3}{x+1}$. Sketch the graph $y=f(x)$. You should find and label all x and y-intercepts, asymptotes, and intervals on which the function is increasing/decreasing, concave up/concave down.
 Hint: long division will help with parts of this problem.

(10 points)

$$\begin{array}{r} x-1 \\ x+1 \overline{) x^2+3} \\ \underline{-(x^2+x)} \\ -x+3 \\ \underline{-x-1} \\ 4 \end{array}$$

so

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

diagonal asympt: $y=x-1$
 vert asympt: $x=-1$

$$\lim_{x \rightarrow -1^+} \frac{x^2+3}{x+1} = \frac{4}{0^+} = +\infty$$

$$\lim_{x \rightarrow -1^-} \frac{x^2+3}{x+1} = \frac{4}{0^-} = -\infty$$

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

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

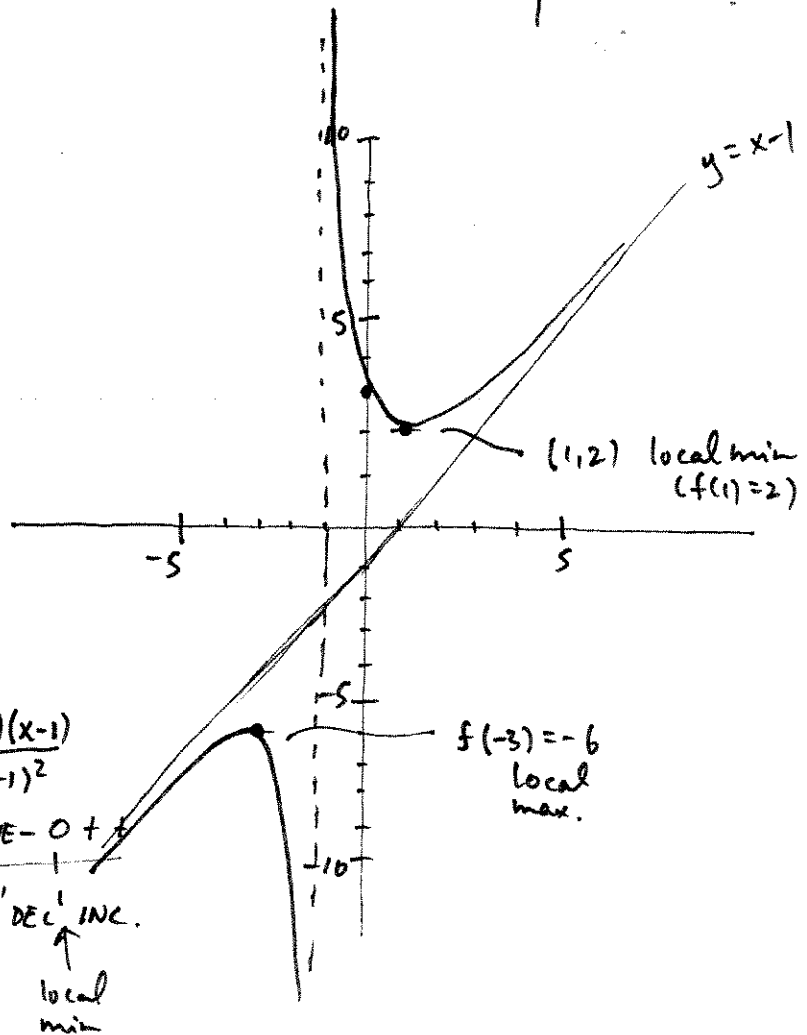
$$f''(x) = \frac{8}{(x+1)^3}$$

sign f''

-	-	+	+
DEC	DEC	INC	INC
		local max	local min

CD CU

x/y	
0/3	
-3/1	$12/2 = -6$
1/4	$4/2 = 2$



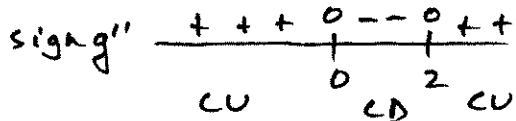
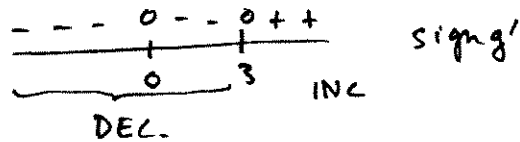
2) Let $g(x) = x^4 - 4x^3$. Sketch the graph $y = g(x)$. Include x and y -intercepts, the intervals on which $g(x)$ is increasing/decreasing, and on which $g(x)$ is concave up/concave down. Also, find all local extrema and inflection points.

(10 points)

$$g(x) = x^4 - 4x^3 = x^3(x-4)$$

$$g'(x) = 4x^3 - 12x^2 = 4x^2(x-3)$$

$$g''(x) = 12x^2 - 24x = 12x(x-2)$$



x	y	
0	0	
4	0	
3	-27	$3^3(-1)$
2	-16	$8(-2)$
-1	5	
-2	16	$16(-2)$

