MA125-8B Quiz 2

Name: __Key__

Exercise 1. *(5 points) Determine the critical points of the function*

$$f(x) = x^3 + 6x^2 - 15x + 3.$$

$f'(x) = 3x^2 + 12x - 15$

$\qquad = 3(x^2 + 4 - 5)$

$\qquad = 3(x+5)(x-1)$

$f'(x)$ exists everywhere so no critical pts from $f'(x)$ being undefined

$f'(x) = 0$ when $x = -5$ and $x = 1$.

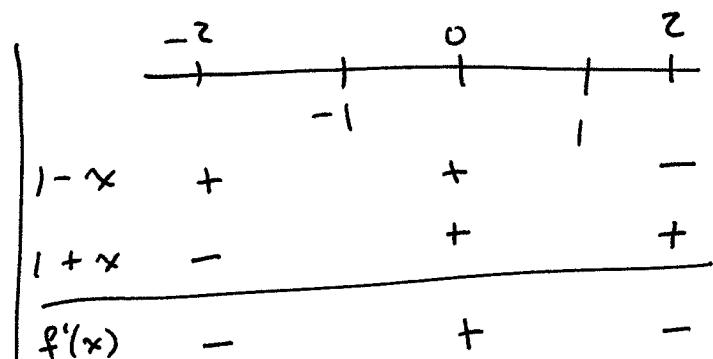**Exercise 2.** *(5 points) Determine where the function*

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

is increasing or decreasing.

$f'(x) = \dfrac{(x^2+1)(1) - x(2x)}{(x^2+1)^2}$

$\qquad = \dfrac{1 - x^2}{(x^2+1)^2}$

$\qquad = \dfrac{(1-x)(1+x)}{(x^2+1)^2}$

$(x^2+1)^2 > 0$ for all x

so critical points are

$x = 1$ & $x = -1$. Also, the

sign of $f'(x)$ depends only

on the sign of the

numerator.

	-2		0		2
		-1		1	
$1-x$	$+$		$+$		$-$
$1+x$	$-$		$+$		$+$
$f'(x)$	$-$		$+$		$-$

f is increasing on $(-1, 1)$

f is decreasing on

$(-\infty, -1) \cup (1, \infty)$.