

Math 1121

Homework #19

27, 30

#27 $f(x) = \frac{x^2 - 2x + 1}{x - 3}$

$$f'(x) = \frac{(x-3)(2x-2) - (x^2-2x+1) \cdot 1}{(x-3)^2} = \frac{2x^2 - 6x - 2x + 6 - x^2 + 2x - 1}{(x-3)^2}$$

$$= \frac{x^2 - 6x + 5}{(x-3)^2} = \frac{(x-1)(x-5)}{(x-3)^2}$$

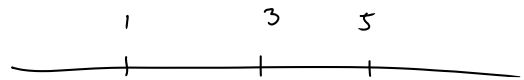
$f' = 0:$ $\frac{(x-1)(x-5)}{(x-3)^2} = 0$

$$(x-1)(x-5) = 0$$

$$x=1 \quad x=5$$

$f' \text{ DNE}$ $(x-3)^2 = 0$

$$x=3$$



f' : + 0 - DNE - 0 +

$$f'(0) = \frac{(0-1)(0-5)}{()^2} = \frac{-}{+} = +$$

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

$$f'(4) = \frac{(4-1)(4-5)}{()^2} = \frac{+}{+} = -$$

$$f'(6) = \frac{(6-1)(6-5)}{()^2} = \frac{+}{+} = +$$

$x=1$ is a rel max

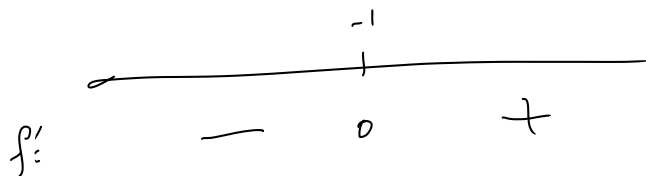
$x=5$ is a rel min

#30 $f(x) = 3xe^x + 2$

$$f'(x) = 3x \cdot e^x + e^x \cdot 3$$
$$= 3e^x(x+1)$$

$$f' = 0: 3e^x(x+1) = 0$$

$$\cancel{3e^x = 0} \quad x+1 = 0$$
$$x = -1$$



$$f'(-2) = 3e^{-2}(-2+1) = -$$

+ -

$$f'(0) = 3e^0(0+1) = +$$

+ +

rel min at $x = -1$