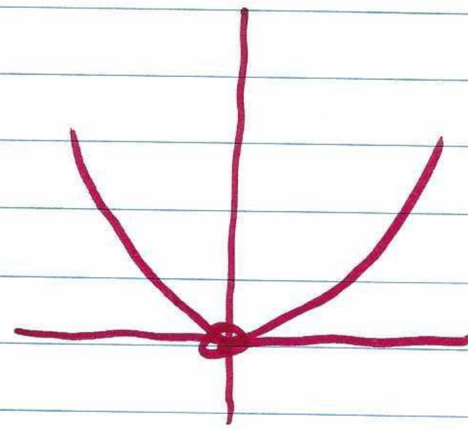
① Given $f(x) = x^2$

where might $f(x)$ have a max/min

$f'(x) = 2x = 0 \Rightarrow x = 0$ is crit pt.



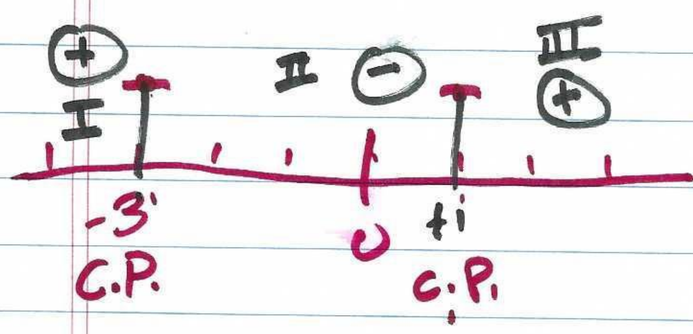
Find intervals where $f(x) = x^3 + 3x^2 - 9x + 4$

are increasing/decreasing or points where

it is stationary

$f'(x) = 3x^2 + 6x - 9 = 3(x^2 + 2x - 3)$

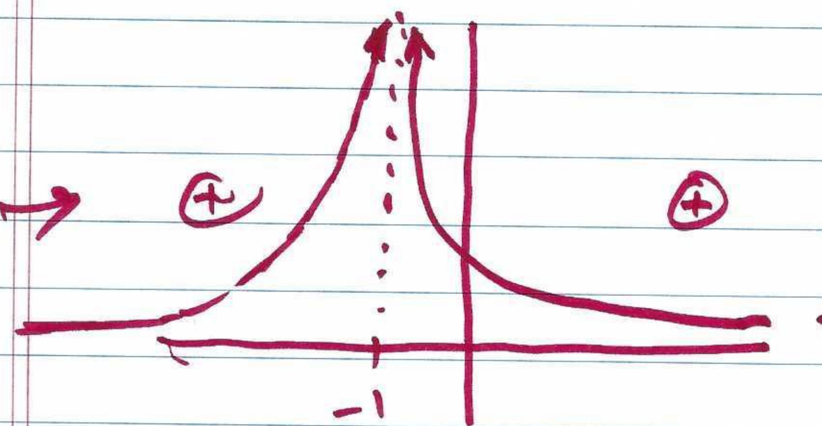
$= 3(x+3)(x-1)$ ✓



②

② If $f(x) =$ [redacted] $\frac{x-1}{x+1}$

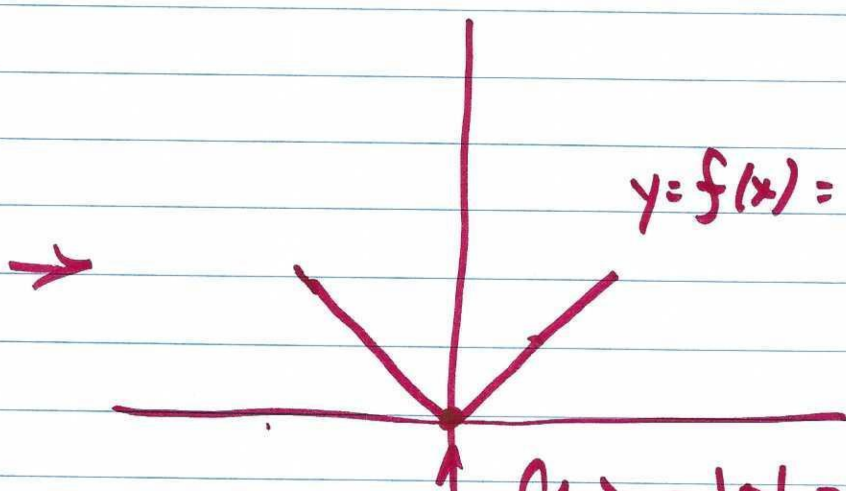
$$f'(x) = \frac{(x+1)(1) - (1)(x-1)}{(x+1)^2} = \frac{2}{(x+1)^2}$$



$f'(-1)$ DNE

C.P.

$x = -1$
asymptote



$y = f(x) = |x|$

$f(0) = |0| = 0$

$f'(0)$ DNE

#57 p.289

SS asset fund

$0 \le t \le 50$

t = # yrs since 2000

$A(t) = .0000329t^3 - 0.00450t^2 + 0.0613t + 2.34$ (in 10^9 \$)

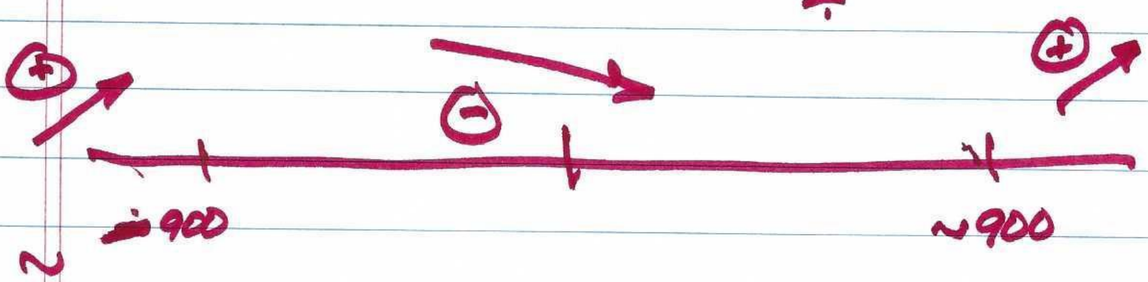
(a) When is $A(t)$ inc. – where $A'(t) > 0$

$A'(t) = .0000987t^2 - .0090t + .0613$

$A'(t) > 0$

$\times 10^5$ $\quad 9.87t^2 - 900t + 6130 > 0$

Use QF $\quad t = \dfrac{900 \pm \sqrt{810{,}000 - (4)(9.87)(6130)}}{2}$



Relative Extrema

During 30-sec TV commercial

$$f(t) = -\frac{3}{20}t^2 + 6t + 20 \quad \Big| \; 0 \le t \le 30$$

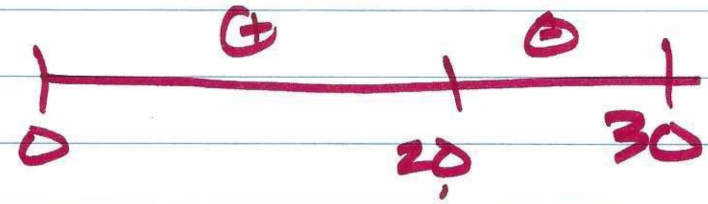
$$f(0) = 20$$

$$f(30) = -135 + 180 + 20 = 65$$

$$f'(t) = -\frac{6}{20}t + 6 = 0$$

$$\frac{6}{20}t = 6 \quad \Rightarrow \frac{t}{20} = 1 \Rightarrow \underline{t = 20}$$

20—



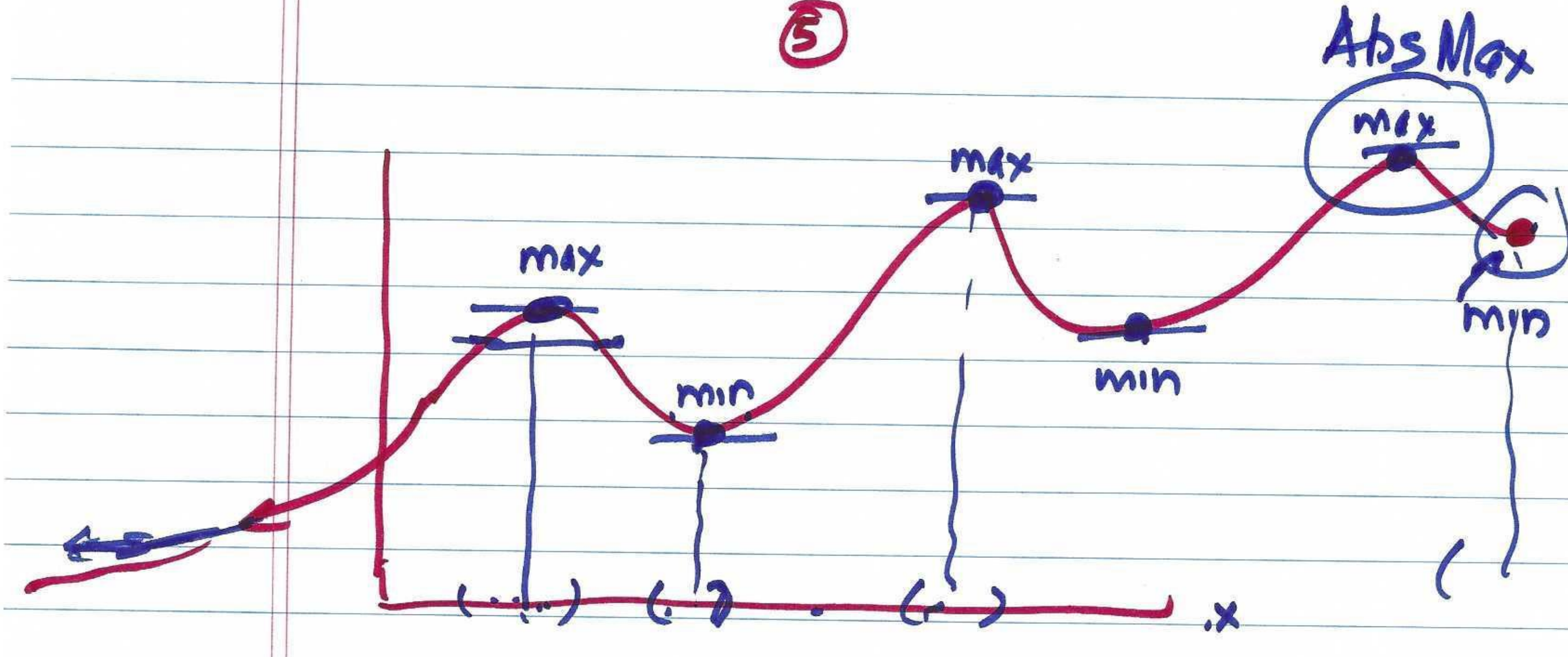
$$6 - \frac{6}{20}t \text{ for } t \in [0, 20] \quad f'(t) > 0$$

$$\text{for } t \in [20, 30] \quad f'(t) < 0$$

$$f(20) = -\frac{3}{20}(20)^2 + 120 + 20$$

$$-60 + 120 + 20 = \underline{\underline{80}}$$

5



Global or Absolute Max / Min