

Exit Ticket Upload: Analyze the function  $f(x) = 2x^5 - 5x^4 - 10x^3$ . This means find all critical numbers, local/relative min/max, intervals for increasing/decreasing, points of inflection and intervals for concavity (both up and down). Must show all work!!!

a) Critical numbers:

$$f'(x) = 10x^4 - 20x^3 - 30x^2$$

$$10x^2(x^2 - 2x - 3)$$

$$10x^2(x-3)(x+1)$$

$$10x^2 = 0$$

$$x-3=0$$

$$x+1=0$$

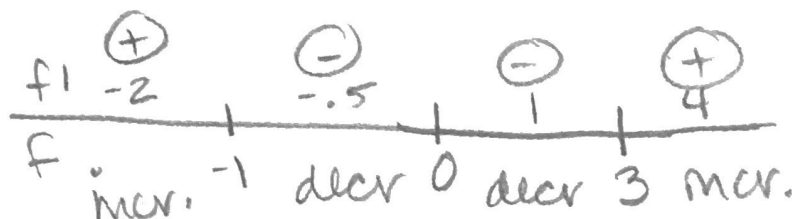
critical #s:

$$x=3$$

$$x=-1$$

$$x=0$$

b) Local min/max:



rel. min @  $x=3$

rel. max @  $x=-1$

c) Intervals of increasing/decreasing:

incr.  $(-\infty, -1) \cup (3, \infty)$

decr  $(-1, 3)$

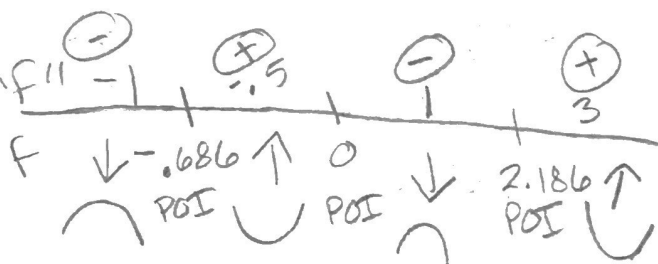
d) Point(s) of inflection:

$$f''(x) = 40x^3 - 60x^2 - 60x$$

$$20x(2x^2 - 3x - 3)$$

$$x=0 \text{ POI}$$

e) Interval(s) of concavity:



$$\begin{aligned} & 2x^2 - 3x - 3 \quad \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ & \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-3)}}{2(2)} \\ & \Rightarrow \frac{3 \pm \sqrt{9 + 24}}{4} = \frac{3 \pm \sqrt{33}}{4} \\ & x = \frac{3 + \sqrt{33}}{4}, \frac{3 - \sqrt{33}}{4} \\ & \text{POI} \quad x = 2.186, -0.686 \end{aligned}$$

Concave  
↓

$(-\infty, -0.686) \cup (0, 2.186)$

Concave  
↑

$(-0.686, 0) \cup (2.186, \infty)$