The graphing problem I messed-up in class, due to wrong sign pattern on f '.

$$f := x \to 1 + \frac{1}{x} + \frac{7}{x^2} + \frac{1}{x^3}$$

$f\left(\frac{-21-\sqrt{417}}{2}\right) \approx 0.9679224558 \approx f(-20.71028893)$ IP

$f(-7-\sqrt{46}) \approx 0.9639126501 \approx f(-13.78232998)$ ~~MAX~~ MIN

$f\left(\frac{-21+\sqrt{417}}{2}\right) \approx 39.82374447 \approx f(-0.28971107)$ IP

$f(-7-\sqrt{46}) \approx 47.18423548 \approx f(-0.217670017)$ ~~MIN~~ MAX

f': $-$ | $-13.8 = 0$ | $+$ | $-.22 = 0$ | $-$ | 0 $\nexists$ | $-$

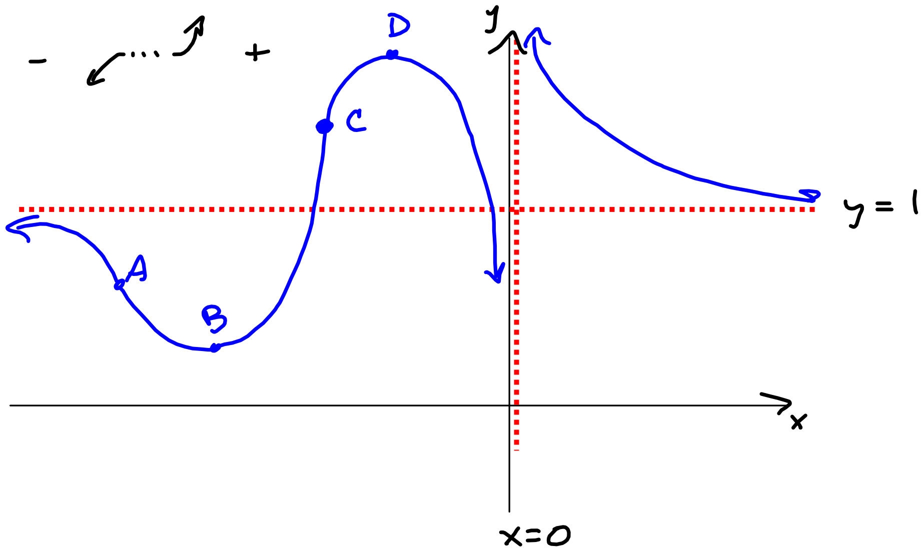
f'': $-$ | $-20.7 = 0$ | $+$ | $-.29 = 0$ | $-$ | 0 $\nexists$ | $+$

$$f' = -\frac{x^2+14x+3}{x^4}$$

$-$ ... $-$

$$f'' = \frac{2(x^2+21x+6)}{x^5}$$

$-$ ... $+$



3.7 application questions.

Find the points on the ellipse $4x^2 + y^2 = 4$ that are farthest away from the point (1, 0).

$(x, y) = \left(\ \right)$ ✖ $-\frac{1}{3}, -\frac{4\sqrt{2}}{3}$ (smaller y-value)

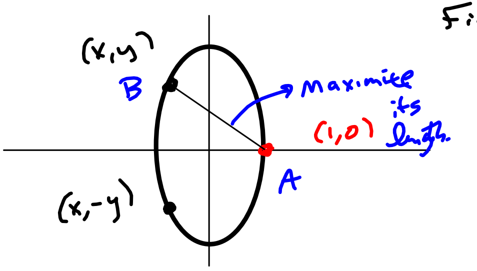
$(x, y) = \left(\ \right)$ ✖ $-\frac{1}{3}, \frac{4\sqrt{2}}{3}$ (larger y-value)

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

$\rightarrow y^2 = 4 - 4x^2$

$y = \pm\sqrt{4-4x^2} = \pm 2\sqrt{1-x^2}$

Farthest from (1,0)



Find it for $y = 2\sqrt{1-x^2}$ & $y = -2\sqrt{1-x^2}$ is same, only negative y-value.

$d(A,B) = \sqrt{(x-1)^2 + (y-0)^2}$ to be maximized

$f(x,y) = \left(d(A,B)\right)^2 = (x-1)^2 + y^2$ to " "

Now, sub for y:

$f(x) = (x-1)^2 + \left(2\sqrt{1-x^2}\right)^2$

$= (x-1)^2 + 4(1-x^2)$

$= (x-1)^2 + 4 - 4x^2$

$\rightarrow f'(x) = 2(x-1)^1 - 8x$

$= 2x - 2 - 8x = -6x - 2 \overset{\text{SET}}{=} 0$

$\rightarrow -6x = 2$

$x = -\frac{2}{6} = -\frac{1}{3}$

$\rightarrow y = 2\sqrt{1 - (-\frac{1}{3})^2} = 2\sqrt{1 - \frac{1}{9}}$

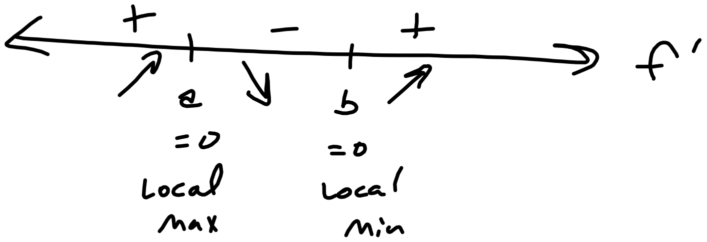
$= 2\sqrt{8/9} = \frac{2 \cdot 2\sqrt{2}}{3} = \frac{4\sqrt{2}}{3}$

Sol'ns:

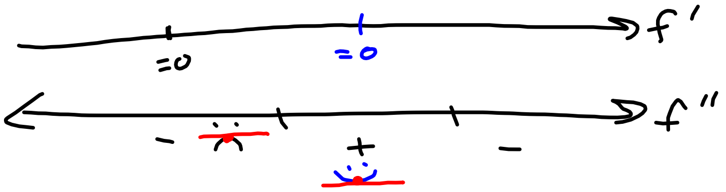
$\left(-\frac{1}{3}, \frac{4\sqrt{2}}{3}\right)$

$\left(-\frac{1}{3}, -\frac{4\sqrt{2}}{3}\right)$

1st derivative Test



2nd Derivative Test:



$f' = 0$:

$f'' > 0$ MIN!

$f'' < 0$ Max.