FINDING RELATIVE EXTREMA

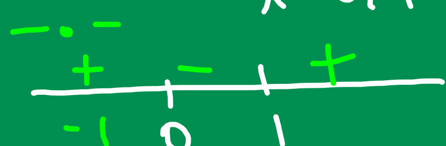
First Derivative Test

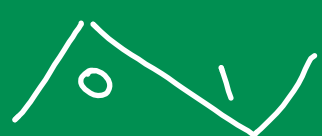
$f(x) = 2x^3 - 3x^2 - 4$

$f'(x) = 6x^2 - 6x = 0$

$\Rightarrow 6x(x-1)$

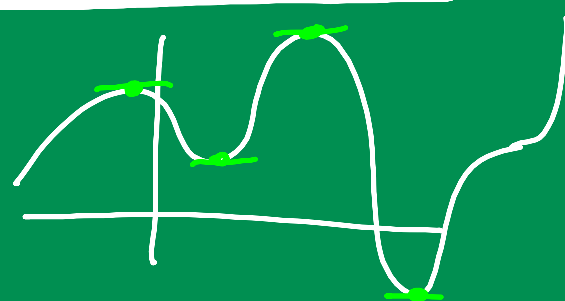
$x = 0, 1$





Rel max $(0, -4)$

Rel min $(1, -5)$



1) Find crit. pts.
2) Test pts. in f'
3) Do the Mountain Test for rel max/min
4) State coordinates (sub in f)

2ND DERIVATIVE TEST

$f(x) = x^3 + 3x^2 + 16$

$f'(x) = 3x^2 + 6x = 0$

$3x(x+2) = 0$

$x = 0, -2$

$f''(x) = 6x + 6$

$f''(0) = +$ ∪

$f''(-2) = -$ ∩

rel min $(0, 16)$

rel max $(-2, 20)$

$-8 + 12 + 16$

1) Find critical pts.
2) Test crit pts. in f'' for concave up/down
3) Write coord using $f(x)$.

If $f''(\#) = 0$, go back to 1st Deriv Test

$$f(x) = \sqrt[3]{4-x^2}$$

$$(4-x^2)^{1/3}$$

Find Rel Extrema.
Use method of your choice.

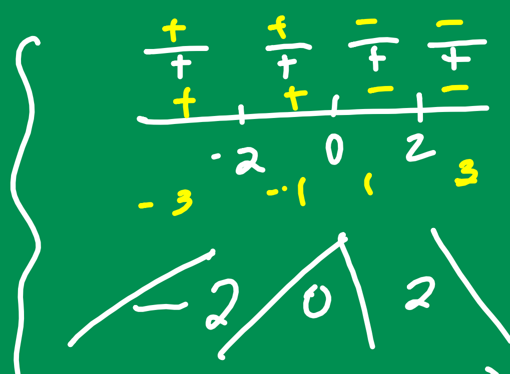
$$f'(x) = \frac{1}{3}(4-x^2)^{-2/3} \cdot -2x$$

$$\frac{-2x}{3(4-x^2)^{2/3}} = 0$$

$$-2x = 0 \qquad 4-x^2 \neq 0$$

$$x = 0 \qquad \pm 4 = x^2$$

$$\pm 2 = x$$



Rel max $(0, \sqrt[3]{4})$