④ $f(x) = \sqrt{4-x^2}$. (Motivating example for Absolute Max/Min on closed intervals).

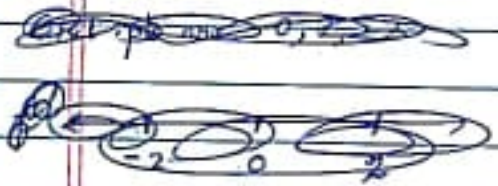
• Domain: $[-2, 2]$.

• So, no question of asymptotes.

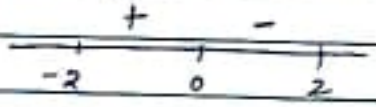
• Intercepts: $(2,0)$, $(-2,0)$, $(0,2)$

• $f'(x) = \dfrac{-x}{\sqrt{4-x^2}}$; $f''(x) = \dfrac{\sqrt{4-x^2}(-1) - (-x)\frac{(-2x)}{2\sqrt{4-x^2}}}{(4-x^2)}$

$= \dfrac{-(4-x^2) - x^2}{(4-x^2)\sqrt{4-x^2}} = \dfrac{-4}{(4-x^2)^{3/2}}$



• f' DNE at $2, -2$ and $= 0$ at $x = 0$



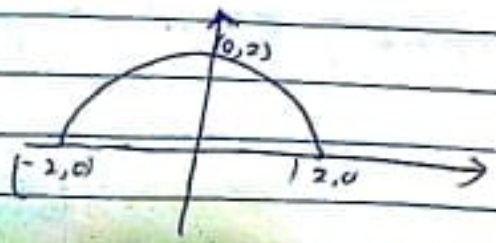
• f''

• No inflection point

• Crit. pts are $0, 2, -2$.

• Rel. min. at $(-2,0)$, $(2,0)$ by plugging in simply can't apply derivative test here at boundary points

• Rel. max. at $(0,2)$



semi-circle)