

2. (16 points) Consider the function  $f(x) = \frac{x^8}{8} + \frac{8x^5}{5}$ . Answer the following questions.

(a) (6 points) Find the critical points of  $f$  (if any).

$$f'(x) = \frac{8x^7}{8} + \frac{8 \cdot 5x^4}{5} = x^7 + 8x^4 = x^4(x^3 + 8) = 0$$

$$x = 0 \text{ or } -2$$

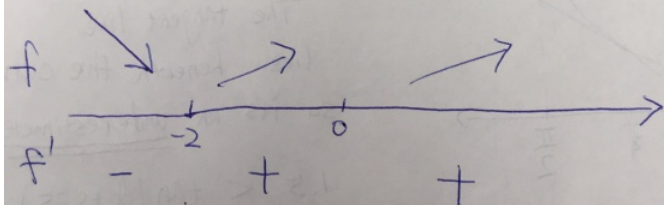
The critical points are 0 and -2.

(b) (10 points) Find all local extrema of  $f$  (if any), and determine what type of extrema they are. Use Calculus to justify your reasoning.

① If  $x \in (-\infty, -2)$ , then  $f'(x) < 0$ ,  $f(x)$  is decreasing

② If  $x \in (-2, 0)$ , then  $f'(x) > 0$ ,  ~~$f(x)$~~   $f(x)$  is increasing

③ If  $x \in (0, +\infty)$ , then  $f'(x) > 0$ ,  $f(x)$  is increasing



local minimum:  $f(-2)$

local maximum: ~~0~~ DNE