

Quiz 7

Let $f(x) = x^3(x-4)$.(a) [2 points] Find the critical points of f .

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

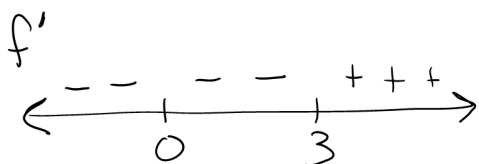
$$f'(x) = 4x^3 - 12x^2$$

$$4x^3 - 12x^2 = 0$$

$$4x^2(x-3) = 0$$

$$x=0 \text{ and } x=3$$

(b) [2 points] Classify each critical point as a local max, a local min, or neither.

 $x=0$ is neither $x=3$ is a local min(c) [1 point] On what intervals is f increasing? On what intervals is f decreasing?decreasing on $(-\infty, 3)$ increasing on $(3, \infty)$

Let $f(x) = x^3(x-4)$.

(d) [2 points] Find the absolute maximum and absolute minimum values of $f(x)$ on the interval $[1,5]$.

$$f(1) = -3$$

absolute min value

$$f(3) = -27$$

$$= -27$$

$$f(5) = 125$$

absolute max value

$$= 125$$

(e) [2 point] Find the intervals on which f is concave up and the intervals on which f is concave down.

$$f''(x) = 12x^2 - 24x$$

$$12x^2 - 24x = 0$$

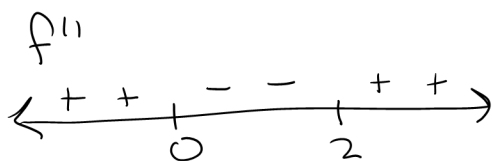
concave up on

$(-\infty, 0)$ and $(2, \infty)$

$$12x(x-2) = 0$$

concave down on

$(0, 2)$



(f) [1 point] Find the coordinates of each point of inflection of f .

$$f(0) = 0$$

$$f(2) = -16$$

$$(0, 0) \text{ and } (2, -16)$$