

Quiz 6 (L14-L16)

Show all work for full credit.

1. Consider the function $f(x) = \frac{x^2 - 3}{2 - x}$.

(i) What are the critical points of f ?

(4 pts.)

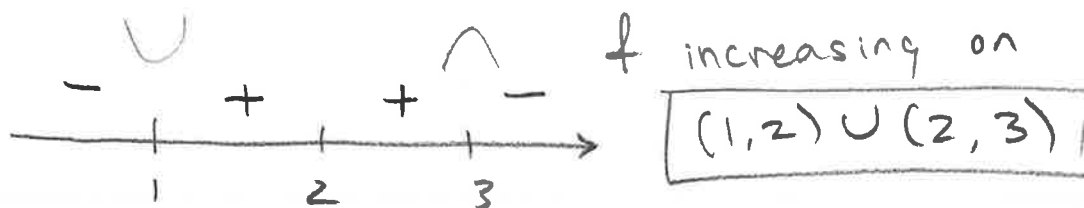
$$f'(x) = \frac{(2-x)(2x) - (x^2-3)(-1)}{(2-x)^2} = 0 \Rightarrow 4x - 2x^2 + x^2 - 3 = 0, x \neq 2$$

$$\Rightarrow -x^2 + 4x - 3 = 0$$

$$\Rightarrow -(x-3)(x-1) = 0, \boxed{x=3, 1}$$

(ii) On what intervals is f increasing?

(3 pts.)



(iii) Classify each critical point as a local max, local min, or neither. (4 pts)

$$\boxed{\begin{array}{l} x=1 \text{ local min} \\ x=3 \text{ local max} \end{array}}$$

$x=2$ undefined,
not a crit. pt.

2. Find the linearization of the function $\ln(2^t - 1)$ at $t = 2$.

(4 pts.)

$$f(t) = \ln(2^t - 1)$$

$$f'(t) = \frac{1}{2^t - 1} * \frac{d}{dt}(2^t)$$

$$f'(t) = \frac{\ln 2 \cdot 2^t}{2^t - 1}$$

$$y = 2^t$$

$$\ln y = t \ln 2$$

$$\frac{y'}{y} = \ln 2$$

$$y' = \ln 2 \cdot 2^t$$

$$L(t) = f(2) + f'(2)(t-2)$$

$$\boxed{L(t) = \ln 3 + \frac{4}{3} \ln 2 (t-2)}$$