

Total: 7 pts

Quiz II

Name: _____

Exercise 1 Compute these limits when they exist:

3 pts

A) $\lim_{x \rightarrow 0} \frac{\sin(x) - x}{x} = \lim_{x \rightarrow 0} \frac{\cos(x) - 1}{1} = \underline{0}$ (H)

B) $\lim_{x \rightarrow 0} \frac{\sin(x) - x}{x^2} = \lim_{x \rightarrow 0} \frac{\cos(x) - 1}{2x} = \lim_{x \rightarrow 0} \frac{-\sin(x)}{1} = \underline{0}$

C) $\lim_{x \rightarrow 0} \frac{\sin(x) - x}{x^3} = \lim_{x \rightarrow 0} \frac{\cos(x) - 1}{3x^2} = \lim_{x \rightarrow 0} \frac{-\sin(x)}{6x} = \underline{-\frac{1}{6}}$,
 (H) (H) proved or (H)

Exercise 2 State the Extreme value theorem as precisely as possible:

2 pts

For any $f: [a, b] \rightarrow \mathbb{R}$ continuous, $\exists x_{\min}, x_{\max} \in [a, b]$ with x_{\max} a global maximum and x_{\min} a global minimum.

Exercise 3 Provide an example of a function with a local maximum or a local minimum which is not a critical point:

2 pts

$\mathbb{R} \ni x \rightarrow |x|$ for $x = 0$.

Provide an example of a function with a critical point which is not a local maximum or a local minimum:

$\mathbb{R} \ni x \mapsto x^3$ for $x = 0$