

Quiz 1

(15 minutes on Tuesday, 15 Sep 2020)

1. [12 points] Determine if the following statements about the limit of a function $f(x)$ are True or False (no need to show your work):
- (a) If $\lim_{x \rightarrow 2} f(x) = 1$, then $f(x) = 1$ for x sufficiently close to 2.
 - (b) If $\lim_{x \rightarrow 0} f(x) = \pi$, then there exists $\delta > 0$ such that $f(x) = 3.14$ to two decimal places when $|x| < \delta$.
 - (c) If for any $\delta > 0$, there exist $x_1, x_2 \in (0, \delta)$ such that $f(x_1) \leq f(x_2) - 0.1$, then $\lim_{x \rightarrow 0} f(x)$ does not exist.

Show your work for the questions below:

2. [18 points] Calculate the following limits:

- (a) $\lim_{x \rightarrow 0} \frac{1 - \cos 4x}{\ln^2(1 + 3x)}$
- (b) $\lim_{x \rightarrow 2^+} \frac{x^2 + x - 6}{x^3 - 4x^2 + 4x}$
- (c) $\lim_{x \rightarrow \infty} \tan \left(\frac{3x\sqrt{x} + 2}{2\sqrt[3]{x^5} + x - 4} \right)$

3. [10 points] For $f(x) = (x - \pi)/|\sin x|$, determine its continuous and discontinuous points and specify the type of discontinuities.