

Serial No.: _____ Student Name: _____ Student Number: _____

Instructor: M. Z. Abu-Sbeih

Math 101- Q1

Date: 24-1-2019

SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERES WITHOUT JUSTIFICATIONS

Problem 1: (5 points) A particle is moving along a straight line with position function

$$s(t) = 2 \sin \pi t + 3 \cos \pi t.$$

Find the average velocity over the time interval $[1,2]$.

Problem 2: (20 points) Find the limit if it exists. If it does not exist, show why. Use the symbols ∞ or $-\infty$ as appropriate.

a) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{|x - 1|}$

b) $\lim_{x \rightarrow 2} \frac{\sqrt{4x + 1} - 3}{x - 2}$

c) $\lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \ln x \right)$

d) $\lim_{x \rightarrow 0^+} \frac{2 + \sqrt{x} e^{\frac{\sin \pi}{x}}}{x - 4}$

e) $\lim_{x \rightarrow 1} ([x] + [1 - x])$

Problem 3: (5 points) If $\lim_{x \rightarrow 0} \frac{\cos x - 2f(x)}{x - \sin x} = 15$, find $\lim_{x \rightarrow 0} f(x)$ if it exists.

Problem 4: (5 points) Find all vertical asymptotes of the function $f(x) = \frac{x \ln(1-x)}{x^3 - 4x}$ if any exists.

Problem 5: (5 points) Use the $\epsilon - \delta$ definition of limit to find the maximum δ corresponding to $\epsilon = 0.1$ in the limit $\lim_{x \rightarrow 0} \sqrt{x+1} = 1$.