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

Instructor: M. Z. Abu-Sbeih Math 101- Q1 Date: 2-7-2018

SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERES WITHOUT JUSTIFICATIONS

Problem 1: (5 points) A ball is thrown up into the air with a velocity of 10 m/sec, its height *t* seconds later is given by $y = f(t) = 10t - 5t^2$.

a. Find the average velocity over the time interval $[1, 1 + h]$.

b. Estimate the instantaneous velocity at $t = 1$.

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) $\lim_{x \to 3} \dfrac{3 - x}{\sqrt{x + 1} - 2}$

b) $\lim_{x \to 0} (\ln x^2 - x^{-2})$

c) $\lim_{x \to 0} (1 - \cos x) \sin \dfrac{1}{2x}$

d) $\lim_{x\to 2}([x]+[1-x])$

Problem 3: (5 points) If $\lim_{x\to 0}\dfrac{2x-f(x)+5}{1-e^{x}}=3$, find $\lim_{x\to 0} f(x)$ if it exists.

Problem 4: (5 points) Find all vertical asymptotes of the function $f(x)=\dfrac{x^2+x-2}{x^4-1}$ if any exists.

Problem 5: (5 points) Use the $\in-\delta$ definition of limit to show that $\lim_{x\to 1}(3-5x)=-2$.

Find the maximum value for δ that correspond to $\in=0.01$