

Serial No.: \_\_\_\_\_ Student Name: \_\_\_\_\_ Student Number: \_\_\_\_\_

Instructor: M. Z. Abu-Sbeih

Math 101- Q1

Date: 6-10-2019

**SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERES WITHOUT JUSTIFICATIONS**

**Problem 1:** (8 points) Use the formal definition of the limit to show that  $\lim_{x \rightarrow 1} (5 - 3x) = 2$ .

Find a number  $\delta$  which corresponds to  $\varepsilon = 0.12$  in the definition.

**Problem 2:** (8 points) Find all values of  $A$  and  $B$  which will make the following function continuous.

$$f(x) = \begin{cases} 1 + e^{\sin x} & | x \leq 0 \\ Ax + B & | 0 < x \leq 2 \\ \frac{x^2 - 4}{x - 2} & | x > 2 \end{cases}$$

**Problem 3:** (8 points) Show that the function  $x - 1 = \sin x$  has a real root.

**Problem 4:** (8 points) Use the definition of the derivative to find the equation of the line tangent to the curve  $y = f(x) = \frac{2}{x+1}$  at  $x = 1$ .

**Problem 5:** (8 points) Find all vertical and horizontal asymptotes of (if any exist) for the curve  $y = \frac{\sqrt{x^2+2}-x}{2x}$