

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

Instructor: M. Z. Abu-Sbeih

Math 101- Q2

Date: 1-7-2015

**SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERS NOT SUPPORTED BY WORK.**

(1) (6 points) If  $f(x) = \sqrt{x+1}$ , use the definition of the derivative to  $f'(3)$ .

(2) (6 points) Find the limit if it exists  $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\tan x - 1}{x - \frac{\pi}{4}}$ .

(3) (6 points) Find  $y'$  if  $y = \frac{x - \tan x}{\sec x}$

(4) (5 points) Find all points  $(x,y)$  on the graph of  $y = \frac{x}{x-2}$  with tangent lines perpendicular to the line  $y = 2x + 3$

(5) (8 points) Find all values of  $a$  and  $b$  that make the function differentiable for all  $x$ -values

$$f(x) = \begin{cases} ax + b & \text{if } x > -1 \\ bx^2 - 3 & \text{if } x \leq -1 \end{cases}$$

(6) (9 points) At a time  $t$ , the position of a body moving along the  $s$ -axis is  $s = t^3 - 3t^2 + 9$ . Find the

(a) body acceleration at each time the velocity is 0.

(b) body speed at each time the acceleration is 0.

(c) total distance traveled by the body from  $t = 0$  to  $t = 2$ .