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

Instructor: M. Z. Abu-Sbeih Math 101- Q2 Date: 23-7-2018

SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERES WITHOUT JUSTIFICATIONS

Problem 1: (10 points) Evaluate the limit if it exists:

(a) $\lim\limits_{x\to\frac{\pi}{6}} \dfrac{6\sin x-3}{6x-\pi}$ (Hint: divide by 6)

(b) $\lim\limits_{x\to 0} \left(\dfrac{x+2x^2}{x}\right)^{\frac{3}{x}}$

Problem 2: (5 points) The two curves $y=x^3-x^2-bx+1$ and $y=a(x+1)^2+b$ intersect at the point (0,1) and have the same tangent line at that point. Find *a* and *b*.

Problem 3: (5 points) If $y = (x + e^x)^{\tan x}$, find $y'(0)$.

Problem 4: (5 points) If $y = (x^2 - 1)(x^2 + 2)(x^3 + 3)(x^4 + 4)(x^5 + 5)$, find $y'(1)$.

Problem 5: (5 points) If $f(x) = (x^2 - 1)^n$, where *n* is a positive integer, find $f^{(2n)}(x)$.

Problem 6: (5 points) If $f(x) = \sec^{-1}(\csc x)$, find $f''(x)$

Problem 7: (5 points) Find the equation of the tangent line to the curve $(x+y)^2 + e^{xy} = 2$ at the point $P(0,1)$.

Problem 8: (5 points) A man 2 meters tall walks directly away from a streetlight that is 8 meters high at a rate of 3/2 m/sec. How fast is the length of his shadow changing?