

Serial No.: _____ Student Name: _____ Student Number: _____
Instructor: M. Z. Abu-Sbeih Math 101- Q4 Date: 29-7-2015

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

(1) (10 points) Consider the function $f(x) = \sin^{-1} \frac{1}{\sqrt{x^2+1}} - \tan^{-1} \frac{1}{x}$. Find $f'(x)$ and simplify your answer completely.

(2) (10 points) Find a linearization of $f(x) = \sqrt{x} + \ln x$ at $x = 1$ and use it to approximate $f(1.1)$.

(3) (20 points) Highway patrol. A highway patrol plane flies 3 mi above a level, straight road at a steady speed of 120 mi/h. The pilot sees an oncoming car and with radar determines that at the instant the line-of-sight distance from plane to car is 5 mi, the line of sight distance is decreasing at a rate of 160 mi/h. Find the car's along the highway