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

Instructor: M. Z. Abu-Sbeih Math 101- Q2A Date: 22-7-2008

Problem 1: (4 points**)** Show that there is a zero of the equation $x^3 - 2x + 3 = 0$ between -2 and -1. (What is the name of the Theorem you used here?.)

Problem 2: (4 points**)** Find the rate of change at which the surface area *S* of the sphere is changing with respect to the radius *r* when the radius $r = 1$. (Note $S = 4\pi r^2$)

Problem 3: (4 points**)** Where is the function $y = \dfrac{x + \ln x}{\sqrt{5 - x}}$ continuous?

Problem 4: (4 points**)** Find all horizontal asymptotes of the function $y = \dfrac{1 - 2\sin x}{1 + x^2}$

Problem 5: (8 points**)** If it exists, find the limit. Use the symbols $\infty \, or \, -\infty$ as appropriate.

a) $\lim\limits_{x \to -\infty} \dfrac{x\sqrt{x^2 + 3}}{1 + x^2}$

b) $\lim\limits_{x \to 1^+} \left[\ln(x - 1) - \ln(\sqrt{x} - 1) \right]$

Problem 6: (6 points) Consider the function $f(x) = 2 + \sqrt{x + 1}$

a. Use the definition to find $f'(0)$

b. Find the equation of the tangent line to the curve at $(0, 3)$.