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

Instructor: M. Z. Abu-Sbeih Math 101- Q2A Date: 15-3-2008

Problem 1: (5 points**)** Show that the function $f(x) = x^5 - 5x^2 + x$ has a real zero in the interval $(1,2)$

Problem 2: (5 points**)** Find all values of *A* and *B* that make the following function continuous.

$$f(x) = \begin{cases} Ax^2 - 5 & if \quad x < -1 \\ Bx & if \quad -1 \le x < 2 \\ A - Bx & if \quad 2 \le x \end{cases}$$

Problem 3: (10 points**)** If it exists, find the limit. Use the symbols ∞ *or* $-\infty$ as appropriate.

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

b) $\lim_{x \to -\infty} \tan^{-1}(x^2 + x^5)$

Problem 4: (5 points) Find the equation of the tangent line to the curve $y = \sqrt{3x+1}$ at $(1,2)$.

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

Instructor: M. Z. Abu-Sbeih Math 101- Q2B Date: 15-3-2008

Problem 1: (5 points**)** Consider the function $f(x) = x^5 - 3x^2 + x + 3$. Show that there is a positive number *c* such that $f(c) = 17$.

Problem 2: (5 points**)** Find all values of *A* and *B* that make the following function continuous.

$$f(x) = \begin{cases} Ax^2 - 7 & if \quad x < -1 \\ Bx & if \quad -1 \le x < 3 \\ A - Bx & if \quad 3 \le x \end{cases}$$

Problem 3: (10 points**)** If it exists, find the limit. Use the symbols ∞ *or* $-\infty$ as appropriate.

c) $\lim_{x \to -\infty} \dfrac{2x\sqrt{x^2+1}}{1-x^2}$

d) $\lim_{x \to \infty} \tan^{-1}(x^2 - x^4)$

Problem 4: (5 points) Find the equation of the tangent line to the curve $y = \sqrt{5x - 1}$ at $(1, 2)$.