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

Instructor: M. Z. Abu-Sbeih Math 101- Q5 Date: 4-4-2014

Problem 1: (20 points) The function $f(x)=x+\frac{1}{x-1}$ has $f'(x)=\frac{x(x-2)}{(x-1)^2}$ and $f''(x)=\frac{2}{(x-1)^3}$

1. Find increasing and decreasing intervals
2. Find local extrema.
3. Find concavity intervals.
4. Find inflection points.

Problem 2: (20 points)

(a) **(**7 points**)** Find the limit if it exists $\lim_{x\to 0}(x+e^x)^{1/x}$

(b) **(**6 points**)** Find the absolute extrema of the function $f(x)=x^{2/3}$ on the interval [-1,2]

(c) **(**6 points**)** Show that the function $f(x)=x^3$ satisfies the hypothesis of the Mean Value Theorem on the interval [0,1], and find the point *c* which is guaranteed by the theorem.