

Serial No.: _____ Student Name: _____ Student Number: _____
Instructor: M. Z. Abu-Sbeih . Math 101- Q6 Date: 26-5-2007 A

Problem 1: (6 points) Find the limit if it exists:

(a) $\lim_{x \rightarrow 0^+} (\sin x \ln x)$

b) $\lim_{x \rightarrow 0} (e^x + x)^{\frac{1}{x}}$

Problem 2: (5 points) Consider the function $f(x) = \frac{x^2}{x-1}$. Given that

$$f'(x) = \frac{x(x-2)}{(x-1)^2} \quad \text{and} \quad f''(x) = \frac{2}{(x-1)^3}.$$

- Find all asymptotes if any exists.
- Find the critical numbers if any exists.
- Find the increasing and decreasing intervals.
- Find the local and absolute extrema if any exists.

- e) Find the concavity intervals.

- f) Find the inflection points if any exists.

- g) Sketch the graph of the function **Clearly indicate all important points on the graph**; such as, extrema, inflection points, and intercepts if any such points exist. Also the concavity must be clear.

Problem 1: (6 points) Find the limit if it exists:

(a) $\lim_{x \rightarrow 0^+} (\tan x \ln x)$

(b) $\lim_{x \rightarrow \infty} (e^x + x)^{\frac{1}{x}}$

Problem 2: (5 points) Consider the function $f(x) = \frac{x}{(x+1)^2}$. Given that

$$f(x) = \frac{1-x}{(x+1)^3} \quad \text{and} \quad f(x) = \frac{2(x-2)}{(x+1)^4}.$$

- a) Find all asymptotes if any exists.

- b) Find the critical numbers if any exists.

- c) Find the increasing and decreasing intervals.

- d) Find the local and absolute extrema if any exists.

e) Find the concavity intervals.

f) Find the inflection points if any exists.

g) Sketch the graph of the function **Clearly indicate all important points on the graph;** such as, extrema, inflection points, and intercepts if any such points exist. Also the concavity must be clear.