MATH 111-007 RECITATION 1117

Problem 1. Evaluate the following limits.

Hint: Indeterminate forms also include "1^∞, 0^0 and ∞^0". You can use L'Hopital when you get indeterminate forms like these when directly plugging in. Remember the logarithmic trick.

(1) $\lim_{x\to 0^+} x^x$.

(2) $\lim_{h\to 0} \frac{e^h-(1+h)}{h^2}$.

Problem 2. Show that there is exactly one root of the equation $e^x + x^3 = 0$.

Problem 3. Sketch the function $f(x) = x(x-2)^2$.

Problem 4. State the **hypothesis** and **conclusion** of the Mean Value Theorem (MVT). Verify that the function $f(x) = \frac{1}{x-1}$ satisfies the **hypothesis** of MVT on the interval $[2, 5]$, and find all values of c in this interval that satisfy the conclusion of the theorem.

Problem 5. Find the open intervals on which the function $f(x) = x - 6\sqrt{x-1}$ is increasing and on which it is decreasing.

Problem 6. Apply Newton's method to the function in Problem 2. Supply your own guess (based on where the root may be). Compute the second iteration x_2 (leave your answer in the most simplified form, however ugly it may seem).

Problem 7. (Challenge problem, do only if you have time – this level of difficulty is unlikely but not unexpected)

A certain apartment complex has three hundred (essentially identical) apartments. The landlord knows that at a rent of one thousand dollars per month every unit will be let, but for each ten dollar rise in the rent, one more unit will go vacant. How much should the landlord charge to maximize his income?