MATH 106 CALCULUS I FOR BIO. & SOC. SCI. FALL 2012

INSTRUCTOR: NITU KITCHLOO

Homework 3.

Please show all your work.

(1) Determine if the following limits exist. When they do find their value

(a)
$$\lim_{x\to 2} e^{x+2}.$$

(b)
$$\lim_{x\to 3^+} \frac{x^3-27}{x-3}.$$

(c)
$$\lim_{x\to 0} \frac{e^x+1}{3x+1}.$$

(d)
$$\lim_{x\to 2^+} \frac{1}{x-2}.$$

(e)
$$\lim_{x\to 0} \frac{\sqrt{x+1}-1}{x}.$$

(2) Consider the function $f(x)$ defined below

$$f(x) = \begin{cases} \frac{1}{x^2} & \text{if} \quad x > 1, \\ 0 & \text{if} \quad x = 1, \\ x^3 - x & \text{if} \quad x < 1. \end{cases}$$

Determine if the following quantities exist. In case they exist, find their values.

(a) $\lim_{x\to 1^+} f(x)$,

(b) $\lim_{x\to 1^-} f(x)$,

(c) $\lim_{x\to 1} f(x)$.

(3) Determine if the function $g(x)$ defined below is continuous at $x = -4$

$$g(x) = \begin{cases} \frac{x^2-16}{x+4} & \text{if} \quad x \neq -4, \\ -8 & \text{if} \quad x = -4. \end{cases}$$

(4) The function $h(x)$ is defined as follows

$$h(x) = \begin{cases} \frac{\sqrt{x}+2}{x+1} & \text{if} \quad x > 0, \\ -2 & \text{if} \quad x = 0, \\ e^{x+c} & \text{if} \quad x < 0. \end{cases}$$

(a) Find the value of c such that $\lim_{x\to 0} h(x)$ exists. Please explain your answer.

(b) Suppose now that c is the number you found in part (a). Is the function $h(x)$ continuous at $x = 0$. Please explain your answer.