Kuwait University	Math. 101	Date :	April 8, 1993.
Dept. of Maths. & Comp. Sc.	First Exam. Incomplete	Duration :	75 Minutes.

Calculators are not allowed

Answer all the following questions.

1. Evaluate each of the following limits (if it exists):

(a) $\lim_{x\to -1} \dfrac{x^4 - x^3 + x - 1}{\sin(x+1)}$,

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

2. Find the horizontal and vertical asymptotes (if any) for the function f given by

$$f(x) = \frac{\sqrt{1-x}}{|x-1|}.$$

3. (a) Let $f(x) = |x^2 - 1|$. Discuss the differentiability of f at $x = 0$ and $x = 1$.

(b) If $2 - \left|x - \frac{5}{2}\right| \le f(x) \le \left(x - \frac{3}{2}\right)[x]$. Find $\lim_{x\to \frac{5}{2}} f(x)$.

4. (a) Find y' if,

$$y = \cos^3\left(\sec^2\left(\sqrt{x^2 - 3x + 1}\right)\right).$$

(b) Find the values of the constants a, b and c so that the graph of the equation $y = ax^2 + bx + c$, passes through the origin and the point $(1,1)$ and its tangent line has slope 3 at the point $(1,1)$.