MATHEMATICS-1 **Test1-B** **NAME: .....**

16 October 2009

1. (6p)	2. (5p)	3. (5p)	4.(5p)	5. (10p)	6. (4p)	Th. (5p)	Σ (Max 40p)

Corrected by: ……

1. a.) Find *N(ε)* for the sequence $a_n = \frac{n^2}{3n^2 - 1}$ if *ε=0,005.*

b.) Find the following limit: $\lim_{n\to\infty} \frac{n}{5^n}$! (Hint: use quotient theorem)

2. Find the points of discontinuity for the following function, and classify them:

$$f(x) = \begin{cases} x^2 + 1 & if \quad x \le 1 \\ \frac{x^2 - 1}{x - 1} & if \quad 1 < x \le 3 \\ \frac{1}{x - 3} & if \quad x > 3 \end{cases}$$

3. Find the equation of the tangent line to $f(x) = (x-3)^3 + \frac{1}{2x-7}$ at the point x_0=4!

4. Find the derivative of the following functions

a.) by definition: $f(x) = \frac{1}{2x - 7}$ b.) by rules: $g(x) = \sqrt{2x + cos^2 x}$

5. Sketch the graph of the function $f(x) = x^2 - \frac{2}{x}$

6. Evaluate $\underline{a} \cdot \underline{b}$ and $\underline{a} \times \underline{b}$ if $\begin{cases} \underline{a} = 3\underline{i} - \underline{j} + 2\underline{k} \\ \underline{b} = 7\underline{i} - \underline{k} \end{cases}$

Theoretical question:

Using the definition of the derivative, show that for the differentiable functions *f(x)* and *g(x)*

$$[f(x) + g(x)]' = f'(x) + g'(x)$$