## **MATHEMATICS-1**

Exam NAME:

**17 December 2010** 

1. (бр)	2. (4p)	3. (7p)	4.(10p)	5. (бр)	6. (15p)	7. (8p)	Th. (4p)	$\Sigma$ (Max 60p)

Corrected by: .....

1. a.) Find  $N(\varepsilon)$  for the sequence  $a_n = \frac{2n^2 - 1}{n^2 + 2}$  if  $\varepsilon = 0,03$ . b.) Find the following limit:  $\lim_{n \to \infty} \left(\frac{3n+1}{3n-1}\right)^{4n}$ 

- 2. Find the equation of the tangent line to  $f(x) = x^3 + 2x + \sqrt[3]{x+7}$  at the point x<sub>0</sub>=1!
- 3. Find the derivative of the following functions

a.) by definition: 
$$f(x) = \sqrt{x+3}$$
 b.) by rules:  $g(x) = \frac{x^3 + 7x + 2}{\cos 2x}$ 

- 4. Sketch the graph of the function  $f(x) = \frac{x^2 3}{x 2}$
- 5. Find the equation of the plane passing through the points  $P_1=(1;0;0)$ ,  $P_2=(1;2;3)$  and  $P_3=(2;1;0)$
- 6. Find the following integrals:

a.) 
$$\int (2x+3) \cdot \cos x \, dx$$
; b.)  $\int_{0}^{\pi/2} \frac{2x-2\sin x}{(x^2+2\cos x)^3} \, dx$ ; c.)  $\int_{0}^{\infty} \frac{16}{x^2+10x+9} \, dx$ 

7. For which values of a and b has the following system of equations

х	+	2y	+	Z.	=	3	a.) exactly one solution
2x	+	5 y	+	5 <i>z</i>	=	6	b.) no solution
- <i>x</i>	_	у	+	$a \cdot z$	=	b	c.) infinitely many solutions

Find the solution of the system if a = 1 and b = -3!

## **Theoretical question:**

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

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