Test of Mathematics

June 8th, 2015

Name:....................................**Surname:**...............................

Matriculation number:........................

1. Determine the domain of the following function:

$$f(x) = log(1 - log\,x)$$

2. Consider the real-valued function defined as follows:

$$y = f(x) = \begin{cases} x^2 - 1 & \text{if } x < 0 \\ -x^3 - 1 & \text{if } x \geq 0 \end{cases}.$$

Determine the inverse function $x = f^{-1}(y)$.

3. Determine the following limit:

$$\lim_{x \to 1} \frac{e^x - e}{1 - \sqrt{x}}.$$

4. Study the following function and draw its graph (just consider the first derivative):

$$f(x) = log\left(\frac{x - 1}{\sqrt{x} + 1}\right).$$

Determine the point(s) at which the function is equal to zero.

5. Determine the following indefinite integral:

$$\int \frac{1}{\sqrt{x}(1 + x)}\,dx.$$

6. Determine the derivatives $f'_x(x, y)$ and $f'_y(x, y)$ of the following real-valued function of two real variables:

$$z = f(x, y) = log(x\,tang\,y).$$