Test of Mathematics

May 28, 2014

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

Matriculation number:.....

1. How many numbers are there of 4 digits (from 1000 to 9999) with the first two digits equal each other (example: 2202)?

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

$$y = f(x) = arctang(1 + x).$$

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

3. Determine the following limit:

$$\lim_{x \to 0} \frac{arctang\, x^2}{1 - cos^2\, x}.$$

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

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

5. Determine the following indefinite integral:

$$\int \frac{e^{\sqrt[3]{x}}}{\sqrt[3]{x^2}}\, dx.$$

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

$$z = f(x, y) = ye^{xy}.$$