Test of Mathematics

June 10, 2014

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

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

1. How many numbers are there of 4 digits (from 1000 to 9999) with the first three digits in increasing order (example: 1272)?

2. Determine the domain of the following real-valued function:
$$y = f(x) = arcsin(2x - x^2).$$

3. Determine the following limit:
$$\lim_{x \to 0} \frac{1 - cos\sqrt{x}}{e^x - 1}.$$

4. Study the following function and draw its graph (just consider the first derivative):
$$f(x) = \frac{x}{x^2 + 1}.$$

5. Determine the following indefinite integral:
$$\int \frac{e^{\sqrt{x}} sin\, e^{\sqrt{x}}}{\sqrt{x}}\, dx.$$

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