Test of Mathematics

September 2nd, 2014

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

Matriculation number:.....

1. How many numbers are there of 5 positive figures summing up to 8 (example: 11231)?

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

$$y = f(x) = \begin{cases} -(x-1)^2 & \text{if } x \leq 1 \\ \sqrt{x-1} & \text{if } x > 1 \end{cases}.$$

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

3. Determine the following limit:

$$\lim_{x \to 0} \frac{e^{x \, sin \, x} - 1}{1 - cos \, x}.$$

4. Determine the domain of the following function:

$$f(x) = \sqrt{\frac{x}{2 - x^2}}.$$

5. Determine the following indefinite integral:

$$\int \frac{tang \sqrt{x}}{\sqrt{x}} \, dx.$$

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

$$z = f(x, y) = xye^{x^2}.$$