

Test of Mathematics

December 3rd, 2012

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

Matriculation number:.....

1. How many numbers are there consisting of 5 figures and with exactly 2 even figures equal to 2 and 3 odd figures with sum 5 (example: 21231)?

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

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

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

3. Determine the following limit:

$$\lim_{x \rightarrow 0} \frac{e^x - e}{\sin(x - 1)} .$$

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

$$f(x) = e^{1 - \frac{1}{x}} .$$

5. Determine the following indefinite integral:

$$\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx .$$

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

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