

Test of Mathematics

June 7, 2016

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

Matriculation number:.....

1. Determine the domain of the following function:

$$f(x) = \sqrt{\log_{\frac{1}{2}}(x-1)}.$$

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

$$y = f(x) = \arctang(\sqrt{x} - 1).$$

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

3. Determine the following limit:

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

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

$$f(x) = \sqrt{\frac{x}{x+1}}.$$

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

5. Determine the following indefinite integral:

$$\int \sin x e^{\cos x} dx.$$

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

$$z = f(x, y) = \log(x - y^2).$$