

Test of Mathematics

August 30, 2016

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

Matriculation number:.....

1. Determine the domain of the following function:

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

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

$$y = f(x) = \arctan^3(x - 1).$$

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

3. Determine the following limit:

$$\lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{\log x}.$$

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

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

5. Determine the following indefinite integral:

$$\int \frac{\arctan^2 x}{x^2 + 1} dx.$$

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

$$z = f(x, y) = \sqrt{x + y^2}.$$