

# Test of Mathematics

November 28, 2016

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

Matriculation number:.....

1. Determine the domain of the following function:

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

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

$$y = f(x) = \arctang(\sqrt[3]{x} - 1).$$

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

3. Determine the following limit:

$$\lim_{x \rightarrow 1} \frac{e^{x^2-1} - 1}{x - 1}.$$

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

$$f(x) = \log\left(\frac{x}{x+1}\right).$$

5. Determine the following indefinite integral:

$$\int \frac{\cos(\arctang x)}{x^2 + 1} dx.$$

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

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