Quiz
November 5, 2007

Solutions of all problems must by accompanied by relevant explanations.

Problem 1. Find the critical numbers of the function $f(x) = (\arctan(x))^2$.

Problem 2. Find the minimum and the maximum value of the function $g(t) = \frac{t^3}{3} - t^2$ on the interval $[-1, 1]$.

Problem 3. Let $f : \mathbf{R} \to \mathbf{R}$ be a differentiable function, such that $f(0) = 1$ and $f'(x) = x - 1$. Following steps below prove that $f(x) = \frac{1}{2}x^2 - x + 1$.

a) Define the function $g(x) = f(x) - (\frac{1}{2}x^2 - x + 1)$ and show that $g'(x) = 0$ for all x.

b) Find $g(0)$. Now explain why g has to be constant function equal to 0.