Math 113 – Homework 4

Due: 22 November 2005 Tuesday.

Q-1) Let $f(x) = x^x$ and $g(x) = x^{x^x}$. Find $f'(x)$, $f''(x)$, $g'(x)$, $g''(x)$. Simplify your answers for ease of reading.

Q-2) Let $I_{n,m} = \int x^n \, (\ln x)^m \, dx$, where n, m are nonnegative integers. Find a formula for $I_{n,m}$ and prove your claim.

Q-3) Let $I_{a,b,c} = \int \dfrac{dx}{ax^2 + bx + c}$, where a, b, c are real numbers with $\Delta = b^2 - 4ac < 0$. Find $I_{a,b,c}$.

Q-4) Find $\displaystyle\int \frac{x \, dx}{x^2 + x + 1}$.

Q-5) Find $\displaystyle\int \frac{x^2 \, dx}{\sqrt{1 - x^2}}$.

`Show in reasonable detail how you solve these problems.`

`Comments and questions to sertoz@bilkent.edu.tr`