

National University of Computer and Emerging Sciences

Instructors: Dr. Imran Shehzad, Ahtsham ul Haq

MT1003 Calculus and Analytical Geometry

Homework 06

Q.1 Use integration by parts to establish the reduction formula:

$$\int (\ln x)^n dx = x(\ln x)^n - n \int (\ln x)^{n-1} dx$$

Then, evaluate the integral

$$\int (\ln x)^5 dx.$$

Q.2 Show that $\int \sqrt{a^2 - x^2} dx = \frac{a^2}{2} \sin^{-1} \frac{x}{a} + \frac{x}{2} \sqrt{a^2 - x^2} + c$.

Q.3 Evaluate $\int x \sin \pi x \cos ex \, dx$.

Q.4 Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin x}{(1+\cos x)(2+\cos x)} dx$.