COMSATS Institute of Information Technology
Attock campus

Department of Mathematics

Assignment # 02

Class: MSc-III
Subject: Real Analysis II
Instructor: Dr. Atiq ur Rehman

Due Date: 29-03-2017
Course Code: MTH322
Marks: 05

Question # 1:

If $\int_a^\infty f\,dx$ is convergent then prove that $\int_b^\infty f\,dx$ is convergent for $b > a$.

Question # 2:

Assume that α is monotonically increasing on $[a, +\infty)$. Suppose that $f \in R(\alpha; a, b)$ and that $g \in R(\alpha; a, b)$ for every $b \ge a$, where $f(x) \ge 0$ and $g(x) \ge 0$ for $x \ge a$. If

$$\lim_{x \to \infty} \frac{f(x)}{g(x)} = 0,$$

then prove that $\int_a^\infty f\,d\alpha$ is convergent if $\int_a^\infty g\,d\alpha$ is convergent.

Question # 3:

Use Dirichlet's theorem to show that $\int_0^\infty \frac{\sin x}{(1+x)^\alpha}\,dx$ converges for $\alpha > 0$.

Academic Honesty Requirements:

You are encouraged to work with others in the completion of assignments but it doesn't include copying. However, in the spirit of Academic Honesty, which includes crediting others for their contribution to your work, please include one of the following statements with every submitted assignment on title page:

1. I worked alone on this assignment.

2. I worked with the following: List their full names. Include their relationship to you if they are not also a member of this class.