



COMSATS University Islamabad

Attock Campus

Department of Mathematics

Assignment # 03

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

Due Date: 29-07-2020
Course Code: MTH321
Marks: 10

Instructions:

- a) Please follow the due date strictly.
- b) Please name the PDF as your registration number (e.g. sp20-mmt-123.pdf) before submission.
- c) Similarity of a solution with other students may reduce your marks.

Question # 1:

If $\sum a_n$ and $\sum b_n$ are convergent, then show that $\sum (a_n + b_n)$ is convergent.

Question # 2:

If $\sum a_n$ with $a_n > 0$ is convergent, then is $\sum a_n^2$ always convergent? Either prove it or give a counter-example.

Question # 3:

Let f be a positive differentiable function on $(0, \infty)$. Prove that

$$\lim_{h \rightarrow 0} \left(\frac{f(x+hx)}{f(x)} \right)^{\frac{1}{h}}$$

exists and non-zero.

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.