



COMSATS Institute of Information Technology, Islamabad
Department of Mathematics
Excercise Set 3

Program: MS/PhD
Semester:

Instructor: Dr. M Saeed Akram
Date: Oct 31, 2016

1. Do Exercises from Ch.4. Royden Q #: 1,7,10,11,12,19,22,23,25,28,29,32,33,34,38,39
2. Do Exercises and Examples from Ch.5. Frank Burk.
3. Do the proof of [Lemma 1, page-72]Royden and [Proposition 2, page-72]Royden.
4. Do the proof of [Theorem 5, page-75]Royden.
5. Do the proof of [Corollary 6, page-76]Royden.
6. Do the proof of [Theorem 10,11 page80-82]Royden.
7. Do the proof of [Theorem 17, Corollary 18 page87-88]Royden.
8. Do the proof of [Theorem 19 page89]Royden.
9. Do the proof of [Theorem 21 page19]Royden.
10. For each natural number n , define

$$f_n(x) = \begin{cases} 0 & \text{if } x \in \{0\} \cup [1/n, 1] \\ n & \text{if } x \in (0, 1/n). \end{cases}$$

Does the passage of the limit under the integral sign i.e.,

$$\lim_{n \rightarrow \infty} \int_0^1 f_n = \int_0^1 \lim_{n \rightarrow \infty} f_n$$

holds? Justify your answer.