

Indian Statistical Institute, Delhi
Maths 271: Mathematical Methods
E. Somanathan

Homework Assignment 6
Due 11.30 a.m. on 24 August 2009

1. Fill in the gaps in the proofs of the following statements made in class.

- (a) Every rational number has a representation as a terminating or recurring decimal series.
- (b) Distinct decimal series have different limits unless one of them ends in

$$\frac{x}{10^n} + \sum_{k=n+1}^{\infty} \frac{9}{10^k}$$

where $x \in \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$ and the other ends in

$$\frac{x+1}{10^n}.$$

2. Show that in any metric space, if a subset K is compact, then K is

- (a) closed,
- (b) bounded.

3. Show that in any metric space, every closed subset of a compact set is compact.