

Indian Statistical Institute, Delhi
Maths 271: Mathematical Methods
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Homework Assignment 5
Due 11.30 a.m. on 17 August 2009

1. Do problem 3 from Assignment 4. You may assume (proof not required) that $\lambda x + (1 - \lambda)y$ is a continuous function.
2. Let $f : X \rightarrow Y$ be continuous.
 - (a) Show that if $S \subseteq Y$ is closed, then $f^{-1}(S)$ is closed in X .
 - (b) Suppose $S \subseteq X$ is closed. Does this imply that $f(S)$ is closed in Y ?
3.
 - (a) Let x be a limit point of the set of images of a sequence $\{x_n\} \subseteq X$. Show that $\{x_n\}$ has a subsequence that converges to x .
 - (b) Suppose a subsequence $\{x_{n_k}\}$ of the sequence $\{x_n\}$ converges to x . Does this imply that x is a limit point of the set of images of $\{x_n\}$?