TOPOLOGY BACKPAPER EXAMINATION

You can quote any result proved in class (unless you are being asked to prove it). Total marks: 100

(1) Show that $[0, 1]$ as a subspace of $\mathbb{R}_l$ is not limit point compact. (10 marks)
(2) Prove that a metrizable space is second countable, if and only if, it is separable (10 marks)
(3) Give (with details) an example of a topological space which is Lindelof but which has a subspace which is not Lindelof. (10 marks)
(4) Show that a connected normal space having more than one point is uncountable. (10 marks)
(5) Show that every compact metric space is second countable. (10 marks)
(6) Prove that a compact Hausdorff space is normal. (10 marks)
(7) Prove that the one point compactification of the real line $\mathbb{R}$ is the circle S^1. (10 marks)
(8) Show that $\mathbb{Q}$ is not locally compact. (10 marks)
(9) Show that the Tietze extension theorem implies the Urysohn lemma. (10 marks)
(10) Prove that an arbitrary product of completely regular topological spaces (with the product topology) is completely regular. (10 marks)

Date: April 21, 2015.