

## TOPOLOGY I

ASSIGNMENT DUE ON 29 AUGUST 2012

- (1) Clearly, the projection maps  $p_\alpha : \prod_\alpha X_\alpha \rightarrow X_\alpha$  take open sets to open sets. Do they also take closed sets to closed sets?
- (2) The product topology on  $(\mathbf{Z}/2\mathbf{Z})^{\mathbf{N}}$  has a countable base.
- (3) The product topology has a countable base if and only if the topology of each coordinate space has a countable base and all but a countable number of coordinate spaces are indiscrete <sup>1</sup>.
- (4) Munkres, §16, problem 9.
- (5) Munkres, §19, problem 7 (only for product topology).
- (6) Show that an uncountable product space  $\prod_\alpha X_\alpha$  is not metrizable (unless all except a countable number of factors are singleton)<sup>2</sup>.

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<sup>1</sup>Kelley, p. 103

<sup>2</sup>Schaum's outline series, General Topology, Chap. 12