

DOCTORAL ENTRANCE EXAMINATION  
GENERAL TOPOLOGY  
MAY 15, 1996

Please use your own paper.

1. Let  $X$  be a topological space. Consider the following topological properties:

normal	Hausdorff	compact
connected	path connected	metrizable

- a. Let  $A$  be a subspace of  $X$ . For which of the above properties does it necessarily follow that if  $X$  has that property then  $A$  has that property. No proofs required.
  - b. Let  $A$  be a closed subspace of  $X$ . For which of the above properties does it necessarily follow that if  $X$  has that property then  $A$  has that property. No proofs required.
  - c. Let  $X/\sim$  be a quotient space of  $X$ . For which of the above properties does it necessarily follow that if  $X$  has that property then  $X/\sim$  has that property. No proofs required.
2. a. If  $X$  is a topological space, then what may one conclude about the components of  $X$ ? No proof required.
- b. If  $X$  is locally connected, then what may one conclude about the components of  $X$ ? No proof required.
- c. If  $X$  is locally path connected, then what may one conclude about the components of  $X$ ? No proof required.