# MS Comprehensive Exam
## Topology
## July 2002

1. Let $X$ and $Y$ be nonempty spaces. Prove that if $X$ and $Y$ are connected, than so is $X \times Y$. Is the converse true?

2. Let $X$ be a compact space, let $Y$ be a Hausdorff space and suppose that $f : X \to Y$ is a continuous surjection. Is the image of every closed set closed? Is the image of every open set open?

3. Let $(X, d)$ be a compact metric space. Prove that every compact subset of $X$ is bounded. Is it true that every closed and bounded subset of $X$ is compact?