

## HW 2 (due on Aug 23, Wednesday, in the class)

Please write your answers clearly and rigorously. Write your name in plain lettering (as opposed to cursive) and also staple all the pages.

1. (Spivak, chapter 2, problem 7 )
  - (a) If  $M$  is a connected smooth manifold,  $p, q \in M$ , then there is a  $C^\infty$  curve  $c : [0, 1] \rightarrow M$  such that  $c(0) = p$  and  $c(1) = q$ .
  - (b) Prove that it is even possible to choose  $c$  to be 1-1.
2. Prove that  $U(n)$  (the group of unitary  $n \times n$  matrices) with its topology arising from  $\mathbb{C}^{n^2}$  can be made into a smooth manifold.