Math 468 - Test 2, April 18,2001

(*Please print*)

Last Name

First name

1. (6pt) If a circle is divided by two diametrical points b and b' in two two (closed) semicircle D and D', show that any continuous map $f : D \to D'$ carries a point to its antipode.

2. (6pt) Consider the union of two *open* tangent disks

$$\{x^2 + y^2 < 1\} \cup \{(x-1)^2 + y^2 < 1\}$$

Is the union of these disks a connected subset in $\mathbb{R}^2$. Is the union

$$\{x^2 + y^2 \leq 1\} \cup \{(x-1)^2 + y^2 < 1\}$$

a connected subset of $\mathbb{R}^2$?

3. (6pt) Compute the Euler characteristics of the six topological spaces depicted in Figure 1. You can use the computations we performed in class, $\chi(\text{circle}) = 0$, $\chi(\text{sphere}) = 2$, $\chi(\text{torus}) = 0$.
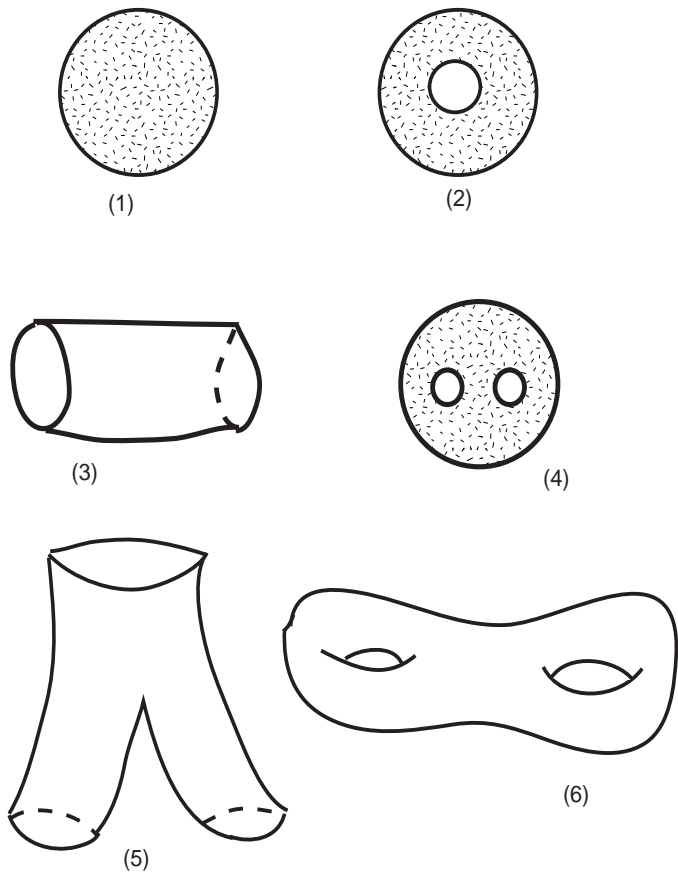
(1)

(2)

(3)

(4)

(5)

(6)

Figure 1: *Six surfaces*