Practice Final, Mathematics 101

Name:______________________

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Problem 1.

Construct a bijection between a square and a closed interval.

Problem 2.

Show that the set of all finite subsets of a countable set is again countable.

Problem 3.

Show that for any three nonempty sets X, Y, Z

$$\left|X^Z \times Y^Z\right| = \left|(X \times Y)^Z\right|.$$

Problem 4.

Draw the Cayley graph of S_4 with generators $a = (12)$ and $b = (1234)$.

Problem 5.

Give an example of a non abelian group of order 12. How many abelian groups of order 12 are there?

Problem 6.

Show that a group with only two subgroups is cyclic.

Problem 7.

Show that there are no continuous injective maps of the unit circle to the real line.