Name: _____

Pid: _____

1. (10 points) Check all the correct statements.
   - ◯ The number of different strings you can get by reordering letters in the word aabbc is 30.
   - ◯ There are 25 different strings of length 5 over the alphabet with two letters.
   - ◯ If you have 26 balls in 5 boxes, then there is a box with at least 6 balls.
   - ◯ There are 6 different surjective functions from [3] to [2].
   - ◯ There are 15 variants to put 4 identical balls into 3 different boxes.

2. (10 points) Let us assume that we are given ℓ lines that are not parallel to each other. Prove that there are at least two of them such that angle between them is at most π/ℓ.

3. (10 points) Prove that for all integers $n > 0$, the sum $\frac{1}{1^2} + \frac{1}{2^2} + \cdots + \frac{1}{n^2}$ is at most 2.

4. (10 points) Find a closed formula (no summation signs) for the expression $\sum_{i=1}^{n} i^2 \binom{n}{i} (-1)^i$.

5. (10 points) How many different words one can get by reordering the letters of the word "combinatorics"?