

Applied Combinatorics, Section N2

Test 3

Name: _____

GTID: _____

<i>Problem</i>	<i>Points</i>
1	
2	
3	
4	
5	
6	

TOTAL: _____

Please do show all your work including intermediate steps and also explain in words how you solve a problem. Partial credits are available.

Problem 1. How many times would you expect to roll a fair die before all 6 sides appeared at least once.

Problem 2. In an election, candidate A receives n votes and candidate B receives m votes, where $n > m$. Assuming that all of the $(n + m)!/n!m!$ orderings of the votes are equally likely, let $P_{n,m}$ denote the probability that A is always ahead in the counting of the votes. Show by induction on $n + m$ that

$$P_{n,m} = \frac{n - m}{n + m}.$$

- Problem 3.** (1) Let $m < n$ be two positive integers. How many paths of length m are there in the complete graph K_n .
- (2) Let v, w be two vertices in K_n . How many walks of length 3 are there from v to w .

Problem 4. Prove or disprove that the graph obtained by removing one edge from $K_{3,3}$ is planar.

Problem 5. Let $G = (V, E)$ be a loop-free undirected graph that is 6-regular. Prove that if $|V| = 11$, then G contains a Hamilton cycle.

Problem 6. List the vertices according to a preorder traversal, inorder traversal and postorder traversal.

