4/22/2025 Patterns in Environmental Mathematics Sitaraman
Test III version 2

Howard University Math Department

NO CALCULATORS ! PLEASE SHOW ALL WORK, DO THEM STEP BY STEP.

1. (Each 5 points) Say whether true or false and justify your answer: If true prove it. If false give counterexample that shows it cannot be true.

   a) A data set with 32 percent of the values outside of one standard deviation of the average could be following normal distribution.

   b) If the Z-score of 40 is 0.3521 it means 85.21 percent of the data are higher than 40.

   c) The correlation coefficient of two sets of data tells you if one of them doesn't cause the other.

2. (15 points) Find the expected winnings at a dice game involving two dice (each has six numbers on it) if you get 12 dollars for (6,6), 11 dollars for (6,5) or (5,6), 10 dollars for (4,6), (6,4), or (5,5), and no money for anything else. First answer these: What is the probability of getting 12 dollars? What is the probability of getting 11? What is the probability of getting 10?

3. (10 points) In problem above, find $P(< 10)$, using the $P(\geq 10)$. Here $P(< 10)$ means probability of getting a total smaller than 10 when you add the values of the two dice.

4. (20 points) (a) Find the number of ways to arrange 6 friends in 5 chairs in a row.

   (b) Find number of ways to pick groups of 5 people from the 6 friends.

5. (10 points) How many ways to pick the correct gold, silver, and bronze medal winners out of 16?

6. (10 points) A combination lock has 3 digits and each digit can be one of 1,2,3,4,5,6, 7 and the digits can be repeated. What is the probability that you pick the right combination in your first try?

7. (20 points) From a group of 9 singers and 9 dancers, a team of 4 is to be chosen that has 2 singers and 2 dancers. How many different teams can be chosen?

8. (10 points extra credit) In problem 4 if you arrange 6 friends in 6 chairs instead of 5 chairs how many ways? Why is it the same as the answer for 4a? Not enough to compare the calculations – you must give a logical reason.