Howard University Math Department

Instructions:

PLEASE PROVIDE STEP BY STEP EXPLANATIONS

WRITING ONLY ANSWERS WILL NOT GET FULL CREDIT

Time Limit 50 minutes. Total 100.

Please read the questions carefully before answering.

NO CELLPHONES.

The first 3 problems involve the following data:

These are the amounts of wind-power produced by the top ten states for wind power in the US, rounded to the nearest Gigawatt, in January 2026 (One GigaWatt can power more than 200,000 homes).

$Texas$	11
$Iowa$	4
$Oklahoma$	4
$Illinois$	3
$Kansas$	3
$Wyoming$	2
$Colorado$	2
$N.Dakota$	2
$Minnesota$	1
$Indiana$	1

1. (20 points) Find the following for the amounts of wind-power:

   (a) average (b) the standard deviation.

   You must show the formulas and all the steps involved.

2. (15 points) Find the median, the mode, and the value in the 65th percentile.

3. (10 points extra credit)

   a) In the problem above, why is the average more than the median?

   b) What does the standard deviation tell about the distribution of the data? Are they spread out or mostly near the average ? Could it be normal distribution?

4. (15 points) For the following sequence, find the common ratio, the formula for the n-th term and calculate the sum of the first 100 values using the formula for the sum of a geometric sequence. (Leave your answers as powers).

$$1,\ 3,\ 9,\ 27, ..., \ldots$$

5. (10 points) If two coins are tossed, find $P(HH)$.

   Then using $P(HH)$ find the probability P(at least one tail).

6. (30 points) (a) Find the number of ways to select color of pants, color of shirt and color of hat from 7 colors, if they should be of different colors.

   (b) Find the number of ways to select color of pants, color of shirt and color of hat from 7 colors, if they can be of same color.

   (c) Find number of ways to pick 3 colors from 7 without regard to what goes where.

7. (10 points) Suppose you are trying to guess what color combination your friend is wearing, and you know your friend always matches the colors of the pants and shirt but the hat could be any one of the 7 colors regardless of the color of the pants and shirt. What is the probability that you guessed the right combination?