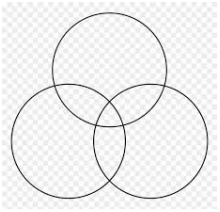
Statistics for Economics-Module 1

BA 2023, MSE, August 15th, 3:45-4:30 PM, 30 marks

1. Write your name and roll number on the top right.
2. Rough sheets will be given. for scribbling. Answer all the questions on the paper and return the paper only (no rough sheets returned). **Put a box around the final answer.**
3. For Problems $1, 2, 6, 7, 8$: **Just write the final answer**. For the problems 3,4,5 state the theorem and define events correctly and then apply the theorem. You dont have to show the arithmetic but the final answer must be in a box.
4. You can write the answer as a fraction. No need to compute decimal approximation.
5. The **total marks** is **24**, but the **maximum marks** you can score is **20**.

Questions

1. **[4 marks]** Label the top circle A, the bottom left circle B and the remaining circle C.



   (a) Shade the region $S = (A \cap B^c \cap C^c) \cup (A^c \cap B)$.

   (b) Write down the expression for $\Pr(A^c \cap B)$ in terms of $\Pr(B)$ and $\Pr(B \cap A)$.

2. **[6 marks]** A biased coin is tossed 3 times. The probability that coin shows a head is p.Write down the set of outcomes for the following events and calculate the probabilities of the events:

   (a) All tosses are heads: $\{HHH\}$ and p^3.

   (b) First and second tosses are heads:

   (c) At least one toss is a head:

   (d) There are odd number of tails in the tosses:

3. **[4 marks]** Company A supplies 10% of the computers sold and is late 5% of the time. Company B supplies 40% of the computers sold and is late 4% of the time. Company C supplies another 50% and is late 2% of the time. A computer arrives late - what is the probability that it came from Company A?

4. **[2 marks]** An urn contains four white chips, five black chips, and three red chips. Four chips are drawn sequentially and without replacement. What is the probability of obtaining the sequence (red,black,red,white)?

5. **[2 marks]** Foreign policy experts estimate that the probability is 0.65 that war will break out next year between two Middle East countries if either side significantly escalates its terrorist activities. Otherwise, the likelihood of war is estimated to be 0.05. Based on what has happened this year, the chances of terrorism reaching a critical level in the next twelve months are thought to be three in ten. What is the probability that the two countries will go to war?

6. **[2 marks]** A fair coin is tossed 3 times. Let A_n denote the event there are 2 tails in the first n tosses for $n = 2, 3$. Compute the probability

$$\Pr(A_3 \mid A_2)$$

7. **[2 marks]** Suppose that $P(A) = 0.1$ and $P(B) = 0.9$, what is the probability $P(A \cup B)$, if A and B are independent?

8. **[2 marks]** Players A, B, and C toss a fair coin in order. The first person to throw a head wins. What is C chances of winning?