

Stat 230

Homework 1 make-up

Due Jun 11 12:30 pm EST.

This is a make-up homework for homework 1 and it is **optional**. Please justify your answers and show all the steps that lead you to your answer. Without a proper explanation, even a perfectly correct answer will receive a low score. Doubts regarding the problem sets/ Problem setup can be posted on Piazza. Simplify the expressions whenever you can.

Pr. 1 A number is picked at random from $1,2,\dots,100$. Find

- the chance that the number picked is a multiple of 4.
- the chance that the number picked has at least one 5 in its digits.(For example: 15,53)
- the chance that the number picked is a multiple of 4 and contains at least one 5 or 6 in its digits.

Pr. 2 Let there be 2 decks of cards: deck A, which is a standard deck of 52 cards and deck B, which is also a standard deck, but with all spades removed. A fair coin is tossed and if it lands "Head" then a random card is picked from deck A. If the coin lands "Tail", a random card is picked from deck B. Calculate:

- the chance that the card picked is a heart.
- the chance that the coin landed "Tail" given that the card picked is black.
- the chance that the card picked is red.

Pr. 3 For 3 events A, B and C ,

- A and C are independent
- B and C are independent
- A and B are disjoint
- $P(A \cup C) = \frac{2}{3}$, $P(B \cup C) = \frac{3}{4}$ and $P(A \cup B \cup C) = \frac{11}{12}$

Find: $P(A)$, $P(B)$, $P(C)$ and $P(A|B \cup C)$.

Pr. 4 An urn contains m black balls and n white balls. A ball is picked from the urn at random and is replaced in the urn along with another ball of the opposite color. A ball is picked once again.

- What is the probability that the second ball is black?
- What is the probability that the first ball drawn is white given that the second ball drawn is black?

Pr. 5 Mark owns a sandwich shop which serves two kinds of sandwiches: chicken and veggie. Each person who comes into his shop has a 70% chance of asking for a chicken sandwich, and 30% chance of asking for a veggie sandwich (Assume each person buys exactly one sandwich). On a certain day Mark has enough ingredients to make 50 chicken sandwiches and 30 veggie sandwiches. Given that Mark got 60 customers that day, calculate the exact probability (to 3 decimal places) that all his customers got sandwiches of their preference.