**Assignment Questions:**

Q1. Sample N random numbers from the following distributions:

Binomial (100, 0.8)

Poisson (100)

Compute the mean and variance of the numbers that you have obtained.

**import numpy as np**

**np.random.seed(100)**

Q2. A pharmaceutical lab states that a drug causes negative side effects in people. The probability of which is 0.03. To confirm this affirmation, another laboratory chooses 5 people at random who have consumed the drug. What is the probability of the following events?

(a) None of the five patients experience side effects (upto two places of decimal).

(b) At least two had side effects (upto four places of decimal).

Q3. Sample random numbers from the following discrete distribution.

|  |  |
| --- | --- |
| X | P(x) |
| 1 | 0.2 |
| 2 | 0.5 |
| 3 | 0.1 |
| 4 | 0.05 |
| 5 | 0.05 |
| 6 | 0.1 |

Use the following code for the seed values:

**import random**

**random.seed(input())**

Q4. Suppose, on a highway, the rate of occurrences of petrol pumps in a range of 100 miles (or km) is 5. What is the probability that 10 2 20 15 5 petrol pumps will occur in the next 100 km.

**Test Case:**

0.02

0.08

0.00

0.0002

0.18

**Practice Questions:**

Q1. You generally take Mid term exams (At LMS) that has 30 multiple-choice questions. Each question has 4 possible options. You know the answer to 15 questions, but no idea about the other 15 questions. So, you call your friends. Luckily, no one has any idea about the questions. Therefore, you decided to do (akkad bakkad bambay bo) and picked answers randomly. Your score Y on the exam is the total number of correct answers. Compute the prob that you will score more than 70% marks.

Q2. For the dataset available at the link: <https://www.kaggle.com/uciml/student-alcohol-consumption#student-mat.csv> (student-mat.csv), answer the following questions.

a) Calculate the probability a student gets an A(80%+), given that the student is:

1. Male

2. Female

b) Calculate the probability a student gets an A (80%+) in math, given that the student’s father’s job and mother job is:

1.Teacher

2. Engineer

c) Calculate the probability a student gets an A (80%+) in math, given that the student’s father’s education is: PG and mother education is: UG.

d) Calculate the probability a student gets an A (80%+) in math, given that the student’s family size is GT3.

You can use the following code if you want any help. You can modify the code to answer the question you want.

//solution for practice question 1.1

import pandas as pd

import numpy as np

df = pd.read\_csv('database.csv')

df.head(3)

//student gets 80+

df['grade\_A'] = np.where(df['G3']\*5 >= 80, 1, 0)

df['sex'] = np.where(df['sex'] == 'M', 1, 0)

df['count'] = 1

df = df[['grade\_A','sex','count']]

df.head()

pd.pivot\_table(

df,

values='count',

index=['grade\_A'],

columns=['sex'],

aggfunc=np.size,

fill\_value=0

)