Assignment 2
Probability and Random Variables

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I. Problem

In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take X = 0 if he opposed, and X = 1 if he is in favour. Find E(X) and Var (X).

II. Solution

A member opposes the proposal : X=0;
A member favours the proposal : X=1;
P(X=0) = 70 % = 0.7
P(X=1) = 30 % =0.3

$$E(X) = \sum_{i=1}^{n} x_i p_i \tag{1}$$

$$= 1 \times 0.7 + 0 \times 0.3 = 0.7 \tag{2}$$

$$\implies E(X) = 0.7 \tag{3}$$

$$E(X^2) = \sum_{i=1}^{n} (x_i)^2 p_i \tag{4}$$

$$= 1^2 \times 0.7 + 0^2 \times 0.3 = 0.7 \tag{5}$$

$$Var(X) = E(X^2) - [E(X)]^2 \tag{6}$$

$$= 0.7 - 0.7^2 = 0.21 \tag{7}$$

$$\implies Var(X) = 0.21 \tag{8}$$

The same result is also obtained using the python code.

```
Mean = 0.7
Variance = 0.21000000000000002
```

Figure 1: Result obtained from python code

Download python code from here

https://github.com/Swati−Mohanty/AI5002/blob/main/Assignment%202/codes/bernoullidist.py

Download latex code from here-

https://github.com/Swati−Mohanty/AI5002/blob/main/Assignment%202/codes/assignment2.tex