ASSIGNMENT 4

CS21BTECH11020

May 15, 2022

Outline

Problem Statment

Class 11 Probability Ex 16.3 Q19

In an entrance test that is graded on the basis of two examinations,the probability of randomly chosen studnet passing the first examination is 0.8 and the probability of passing the second examination is 0.7. The probability of passing atleast one of them is 0.95. What is the probability of passing both ?

Solution

There are two exams: Exam A and Exam B
Let Random varaibles X and Y represent Status of Exam A and Exam B respectively.

	Fail	Pass
X	0	1
Y	0	1

Given Data

$$P_X(X = 1) = 0.8 \tag{1}$$
$$P_Y(Y = 1) = 0.7 \tag{2}$$
$$P_{X+Y}(X + Y = 1) = 0.95 \tag{3}$$

Continued ...

Principle of Inclusion And Exclusion

It states that for finite sets $A_1, ..., A_n$, one has the identity

$$\left|\bigcup_{i=1}^{n} A_i\right| = \sum_{\phi J \subseteq \{1,...,n\}} (-1)^{|J|+1} \left|\bigcap_{j \in J} A_j\right| \tag{4}$$

Using equation (4), we have

$$P_{X+Y}(X+Y) = P_X(X) + P_Y(Y) - P_{XY}(XY) \tag{5}$$

Using (1),(2) and (3), we get

$$0.95 = 0.8 + 0.7 - P_{XY}(XY = 1) \tag{6}$$

$$P_{XY}(XY = 1) = 0.55 \tag{7}$$

Python Code

```
#Given data
P_A1= 0.8
P_B1= 0.7
P_AorB1=0.95

#Inclusion and Exclusion
P_AandB1=P_A1+P_B1-P_AorB1
print(P_AandB1)
```