1. Consider an example where a pack contains 4 blue, 2 red and 3 black pens. If a pen is drawn at random from the pack, replaced and the process repeated 2 more times, What is the probability of drawing 2 blue pens and 1 black pen?

Ans. Total number of pens = 4+2+3=9
Total number of pens = 4+2+3=9
Since the process involves replacement after each iteration, the denominator will not change. Therefore:

P(blue)=49P(blue)=49
P(black)=39P(black)=39
P=P(blue)2×P(black)=48729=16243

2. In a class , 40% of the students study math and science. 60% of the students study math. What is the probability of a student studying science given he/she is already studying math?

Ans. Probability of Maths and Science students = 40/100 = 2/5

Probability of maths students = 60/100 = 3/5

P(Science/Maths) = P(S∩M)/ P(M) = (5*2)/(3*5) = 2/3 ~ 0.66

3. A box contains 4 choco-bars and 4 ice creams. Tom eats 3 of them, by randomly choosing. What is the probability of choosing 2 choco-bars and 1 ice cream?

Ans. The number of chocobars : 4

The number of ice-creams : 4

Total number of items : $4 + 4 = 8$

Now, if Tom eats 3 of them, by randomly choosing.Then the probability of choosing 2 chocobars and 1 ice-cream is given by :-

P(2 choco-bars, 1 ice-cream) = $({}^4C_2 \text{ X } {}^4C_1)/ {}^8C_3$

= ((4! X 4)/(2!X(4-2)!)) / (8!/(3!X(8-3)!)

= 3/7

Hence, the probability of choosing 2 chocobars and 1 ice-cream = 3/7

4. State if the below statement is true or false also give the reason why

A p-value of 0 .08 is more evidence against the null hypothesis than a p-value of .04.

Ans. False. A small p-value means the value of the statistic we observed in the sample is unlikely to have occurred when the null hypothesis is true. Hence, a .04 p-value means it is even more unlikely the observed statistic would have occurred when the null hypothesis is true than a .08 p-value. The smaller the p-value, the stronger the evidence against the null hypothesis.

5. What is Null Hypothesis? Also explain the adjacent/alternate hypothesis?

Ans Null Hypothesis

The null hypothesis is the claim that there's no effect in the population.If the sample provides enough evidence against the claim that there's no effect in the population ($p \leq \alpha$), then we can reject the null hypothesis. Otherwise, we fail to reject the null hypothesis.Although "fail to reject" may sound awkward, it's the only wording that statisticians accept. Be careful not to say you "prove" or "accept" the null hypothesis.

Alternate Hypothesis

Often, your alternative hypothesis is the same as your research hypothesis. In other words, it's the claim that you expect or hope will be true.

The alternative hypothesis is the complement to the null hypothesis. Null and alternative hypotheses are exhaustive, meaning that together they cover every possible outcome. They are also mutually exclusive, meaning that only one can be true at a time.