**STATISTICS**

**ASSIGNMENT-3**

**Solve at least 3 exercises.**

**EXERCISE 1.**

Answer the following questions by calculating the number of ways of obtaining particular arrangements of objects and events.

1. An athlete has 8 different trophies, but only has room for 4 trophies in a display cabinet. How many different ways is it possible to display just 4 trophies out of 8, assuming that the display order is important? (Permutation)

**ANSWER :** 8! / (8-4)! = 8 \* 7 \* 6 \* 5 = 1680

1. A football manager has a squad of 20 players. How many different teams of 11 players could be selected from the squad? (Hint: Assume that positions of the players are not important) (Combination)

**ANSWER :** 20! / [(20-9)! \* 9!] = 20! / [11! \* 9!] = 12920

**EXERCISE 2.**

Are people happy in their marriages? The table shows results from the 2008 General Social Survey for married adults classified by gender and level of happiness.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Gender** | **Very Happy** | **Pretty Happy** | **Not too Happy** | ***Total*** |
| Male | 183 | 243 | 43 | ***469*** |
| Female | 215 | 247 | 38 | ***500*** |
| ***Total*** | ***398*** | ***490*** | ***81*** | ***969*** |

1. Estimate the probability that a married adult is very happy.

**ANSWER :** 398 / 969 = 0.410

1. Estimate the probability that a married adult is very happy,   
   (i) given that their gender is male and

**ANSWER :** 183 / 469 = 0.390  
(ii) given that their gender is female.

**ANSWER :** 215 / 500 = 0.43

1. For these subjects, are the events being very happy and being a male independent?

**ANSWER :** They are dependent. Because the probability of being very happy is effected by being a male.

**EXERCISE 3.**

The Triple Blood Test screens a pregnant woman and provides as estimated risk of her baby being born with the genetic disorder Down syndrome. A study of 5282 women aged 35 or over analyzed the Triple Blood Test to test its accuracy.

A contingency table for Triple Blood Test of Down syndrome shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Down** | **POS** | **NEG** | ***Total*** |
| D (Down) | 48 | 6 | ***54*** |
| Dc (unaffected) | 1307 | 3921 | ***5228*** |
| ***Total*** | ***1355*** | ***3927*** | ***5282*** |

1. Given that a test result is negative, show that the probability the fetus actually has Down syndrome is P(D | NEG) = 0.0015.

**ANSWER :** P(D | NEG) = P(D ∩ NEG) / P(NEG)

P(D | NEG) = 6 / 3927 = 0.0015

1. Is P(D | NEG) equal to P(NEG | D)? If so, explain why. If not, find P(NEG | D).

**ANSWER :** No, they are not equal. Their sample sets are different.

P(NEG | D) = P(D ∩ NEG) / P(D)

P(NEG | D) = 6 / 54 = 0.11

**EXERCISE 4.**

Males and females are observed to react differently to a given set of circumstances. It has been observed that 70% of the females react positively to these circumstances, whereas only 40% of males react positively -. A group of 20 people, 15 female and 5 male, was subjected to these circumstances, and the subjects were asked to describe their reactions on a written questionnaire. A response picked at random from the 20 was negative. What is the probability that it was that of a male?

**ANSWER :**

|  |  |  |
| --- | --- | --- |
|  | Pozitive | Negative |
| Female | 0.7 | 0.3 |
| Male | 0.4 | 0.6 |

>>> 15 15.(0,3) = 4.5 (Negative female)

>>> 5 5.(0.6) = 3 (Negative male)

The negative status of person selected from 20 people has been definitively. That means; our sample set is the state of being negative :

4.5 + 3 = 7.5

The probability that a male individual who is definitely known to have made a negative choice will be selected from among 20 people :

3 / 7.5 = 0.4