Programme Name: **BCS HONS**

Course Code: **STAT 1000**

Course Name: **Introduction to Statistics**

First Assignment

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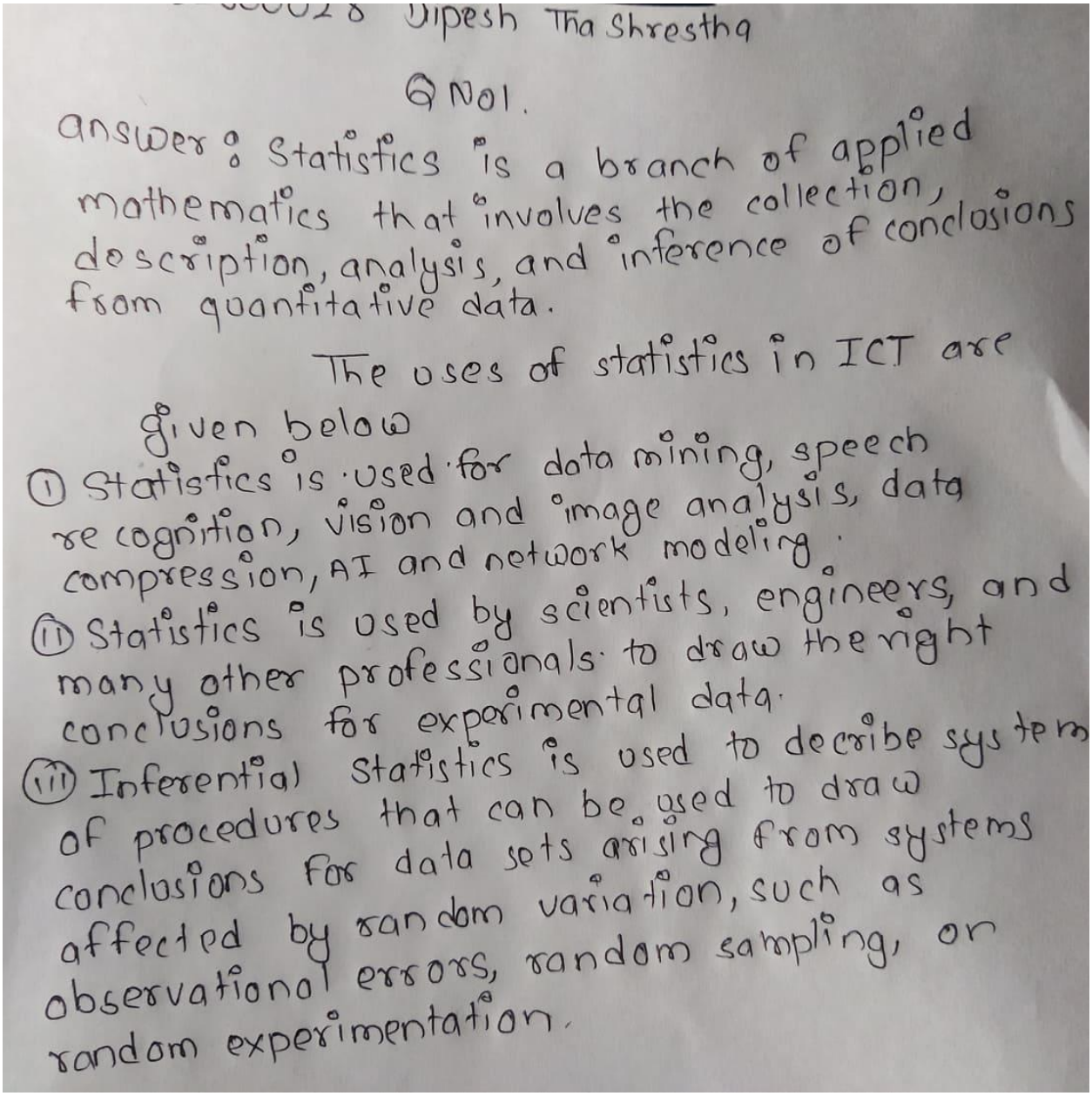
1. Define statistics. What are the uses of statistics in ICT give suitable examples



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Q No1.

answer : Statistics is a branch of applied mathematics that involves the collection, description, analysis, and inference of conclusions from quantitative data.

The uses of statistics in ICT are given below

(i) Statistics is used for data mining, speech recognition, vision and image analysis, data compression, AI and network modeling.

(ii) Statistics is used by scientists, engineers, and many other professionals to draw the right conclusions for experimental data.

(iii) Inferential statistics is used to decribe system of procedures that can be used to draw conclusions for data sets arising from systems affected by random variation, such as observational errors, random sampling, or random experimentation.

2. In a deck of 52 cards, a card is drawn at random. What is the probability that the card is black or king?

Q No 2.

Solution//

Let B and K be the events of Black card and king card respectively.

Given,

$n(B) = 26$

$n(K) = 4$

$n(S) = 52$

$n(B \cap K) = 2$.

Now,

Probability of getting black or king card is $P(B \text{ or } K) = P(B) + P(K) - P(B \cap K)$

$$= \frac{n(B)}{n(S)} + \frac{n(K)}{n(S)} - \frac{n(B \cap K)}{n(S)}$$

$$= \frac{26}{52} + \frac{4}{52} - \frac{2}{52}$$

$$= \frac{26+4-2}{52}$$

$$= \frac{28}{52}$$

$$= 7/13 //$$

∴, Therefore, Probability of getting Black or king card is 7/13//

Q.N. 3

Following are the marks secured by Mr.A and Mr.B in 10 tests of 50 marks each

Test	1	2	3	4	5	6	7	8	9	10
Marks Secured by A	24	37	27	30	31	34	36	26	29	33
Marks Secured by B	22	40	35	24	26	36	34	28	30	27

a. If the consistency of performance is the criteria for awarding a prize. Who should be awarded by the prize?
b. Who is better?
c. Who is more intelligent?

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Q No 3

Solution.

For Mr A

X	X^2
24	576
37	1369
27	729
30	900
31	961
34	1156
36	1296
26	676
29	841
33	1089
$\Sigma X = 307$	$\Sigma X^2 = 9593$

$N = 10$.

$\bar{X} = \frac{\Sigma X}{N} = \frac{307}{10} = 30.7$.

$SD \text{ of } A = \sqrt{\frac{\Sigma X^2}{N} - \left(\frac{\Sigma X}{N}\right)^2}$

$= \sqrt{\frac{9593}{10} - (30.7)^2}$

$= \sqrt{959.3 - 942.43}$

$= 4.1$.

$CV_A = \frac{S.D(A)}{\bar{X}} \times 100\%$

$= \frac{4.1}{30.7} \times 100\%$.

$= 19.36\%$.

For Mr B.

X	X^2
22	484
40	1600
35	1225
24	576
26	676
36	1296
34	1156
28	784
30	900
27	729
$\Sigma X = 302$	$\Sigma X^2 = 9426$

$N = 10$.

$\bar{X} = \frac{\Sigma X}{N} = \frac{302}{10} = 30.2$.

$S.D \text{ of } B = \sqrt{\frac{\Sigma X^2}{N} - \left(\frac{\Sigma X}{N}\right)^2}$

$= \sqrt{\frac{9426}{10} - (30.2)^2}$

$= \sqrt{942.6 - 912.04}$

$= 5.53$.

$CV_B = \frac{S.D}{\bar{X}} \times 100\%$.

$= \frac{5.53}{30.2} \times 100\%$.

$= 18.31\%$.

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(a)

Since, the C.V of A is less than of B, hence A has more ~~consistency~~ consistency.

So, Mr A should be awarded by the Price

(b)

As we know,

The mean value of Mr A is 30.7

whereas Mr B is 30.2.

Therefore, Mr A is better than Mr B,

Because Mr A has high mean value that Mr B

(c)

Arranging the data in ascending order

For Mr A

24, 26, 27, 29, 30, 31, 30, 34 36, 37. (n=10)

Position of median = $\left(\frac{N+1}{2}\right)^{th}$ term

$= \left(\frac{10+1}{2}\right)^{th}$ term

$= 5.5^{th}$ term.

So median = $\frac{(5^{th}+6^{th})\text{ term}}{2}$

$= \frac{30+31}{2} = \frac{61}{2} = 30.5$

For Mr B.

22, 24, 26, 27, 28, 30, 34, 35, 36, 40. (n=10)

Position of median = $\frac{(N+1)^{th}}{2}$ term

$= 5.5^{th}$ term

median = $\frac{(5th+6th)\text{term}}{2}$

$= \left(\frac{28+30}{2}\right)^{th}$ term.

$= 58/2 = 29.$

∴ Therefore, Mr A is more intelligent because Mr A median is high or greater than of Mr B

Q.N. 4

The following table shows the survey results regarding the purchase behavior of HDTV's and DVD players in the last six months of 300 house hold.

Purchased Force TV	**Purchase DVD**		
	Yes	No	Total
Force TV	38	42	80
Not Force TV	70	150	220
Total	108	192	300

a. What is the probability that purchased a TV set which is Force TV?

b. Find the probability that a randomly selected household that purchased a force TV and DVD player?
c. What is the probability that they purchased Force TV or DVD players?
d. What is the probability that a house hold purchased a DVD player when it is given that household purchased Force TV?

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Q No 4

Solution,

Let, F be event of Force TV and D for DVD player.

(a)

→ Probability that purchased TV set is of Force TV is :- P(F).

$n(F) = 80$

$n(S) = 300$

$\therefore P(F) = \frac{n(F)}{n(S)} = \frac{80}{300} = 4/15.$

(b)

→ Probability that a randomly selected household that purchased force TV & DVD player = P(F∩D).

$\therefore P(F \cap D) = \frac{38}{300} = \frac{19}{150}$ $\left(\begin{matrix} n(D) = 108 \\ n(S) = 300 \end{matrix} \quad n(F) = 80. \right)$

(c)

→ Probability that they purchased force TV or DVD player = P(F∪D).

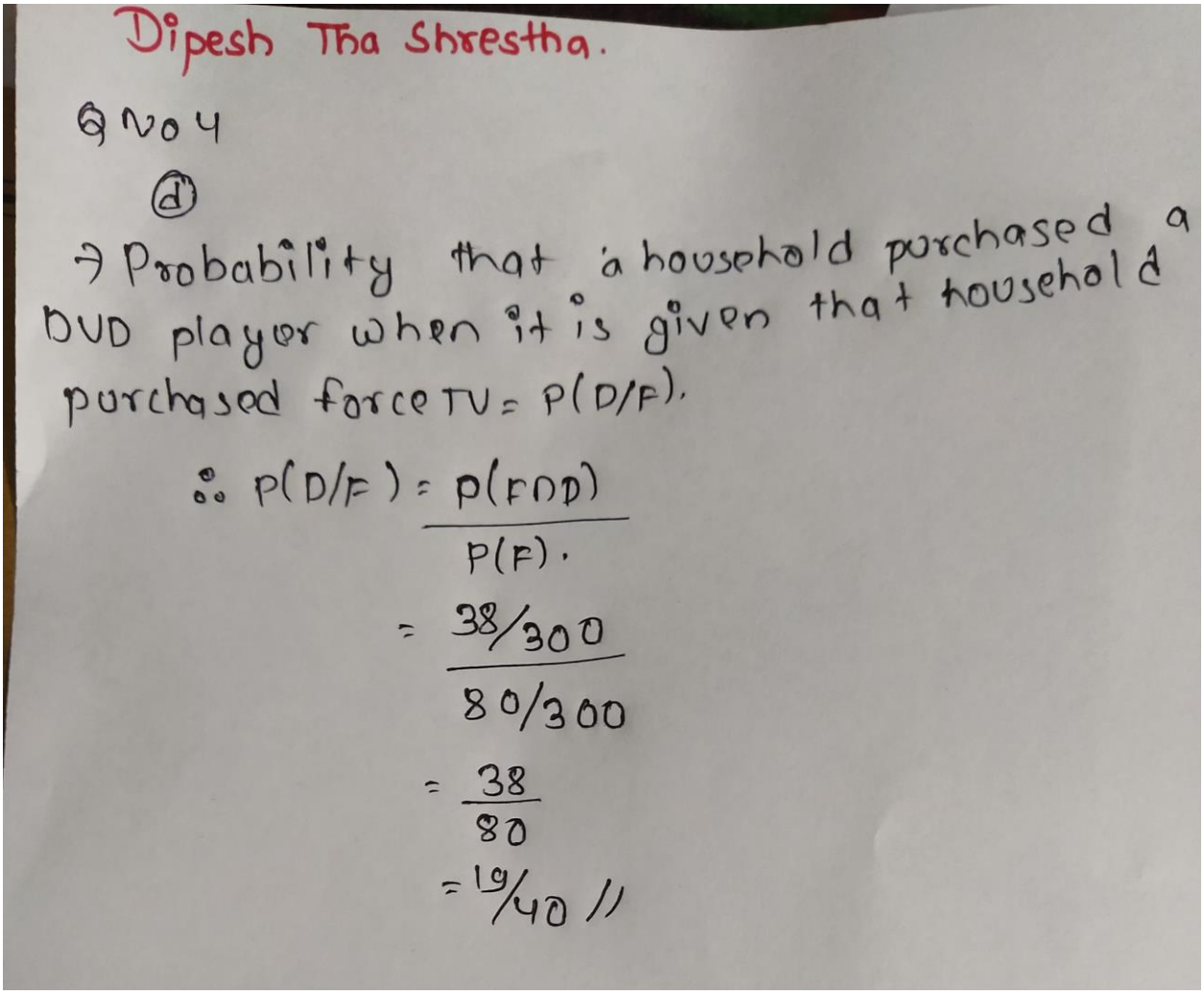
$n(F) = 80$, $n(S) = 300$, $n(D) = 108$, $n(F \cap S) = 38$

$\therefore P(F \cup D) = P(F) + P(D) - P(F \cap D)$

$= \frac{n(F)}{n(S)} + \frac{n(D)}{n(S)} - \frac{n(F \cap D)}{n(S)}.$

$= \frac{80}{300} + \frac{108}{300} - \frac{38}{300}$

$= \frac{150}{300} = 1/2$



Q.N.5

According to the data from American Medical Association 15 %of US are left handed.

a) If 4 people are randomly selected
   i. What is the probability that they are all left- handed?
   ii. What is the probability that at least one of them is left handed?
b) If groups of 50 people are randomly selected
   i. What is the mean number of left-handed people in such group?
   ii. What is the standard deviation for the numbers of left handed people in such groups?

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QNo5

Solution//

(a) If 4 people are randomly selected.

Given,

$p = 15\% = 0.15$.

$q = (100-15)\% = 85\% = 0.85$.

Total trial $(n) = 4$.

Here, p represent the probability for left handed people.

(i) If all are left handed.

$r = 4$

$P(r=4) = {}^{n}C_r p^r q^{n-r}$

$= {}^{4}C_4 p^4 q^0$

$= 1 \times (0.15)^4 \times 1$

$= 0.00051$

(ii) For one of them to be left handed, $r = 1$

Now, Probability $P(r=1) = {}^{n}C_r p^r q^{n-r}$

$= {}^{4}C_1 p^1 q^3$

$= 0.368$

For two of them to be left handed, $r = 2$.

$P(r=2) = {}^{n}C_r p^r q^{n-r} = {}^{4}C_2 (0.15)^2 (0.85)^2 = 0.098$

For Three of them to be left handed, $r = 3$.

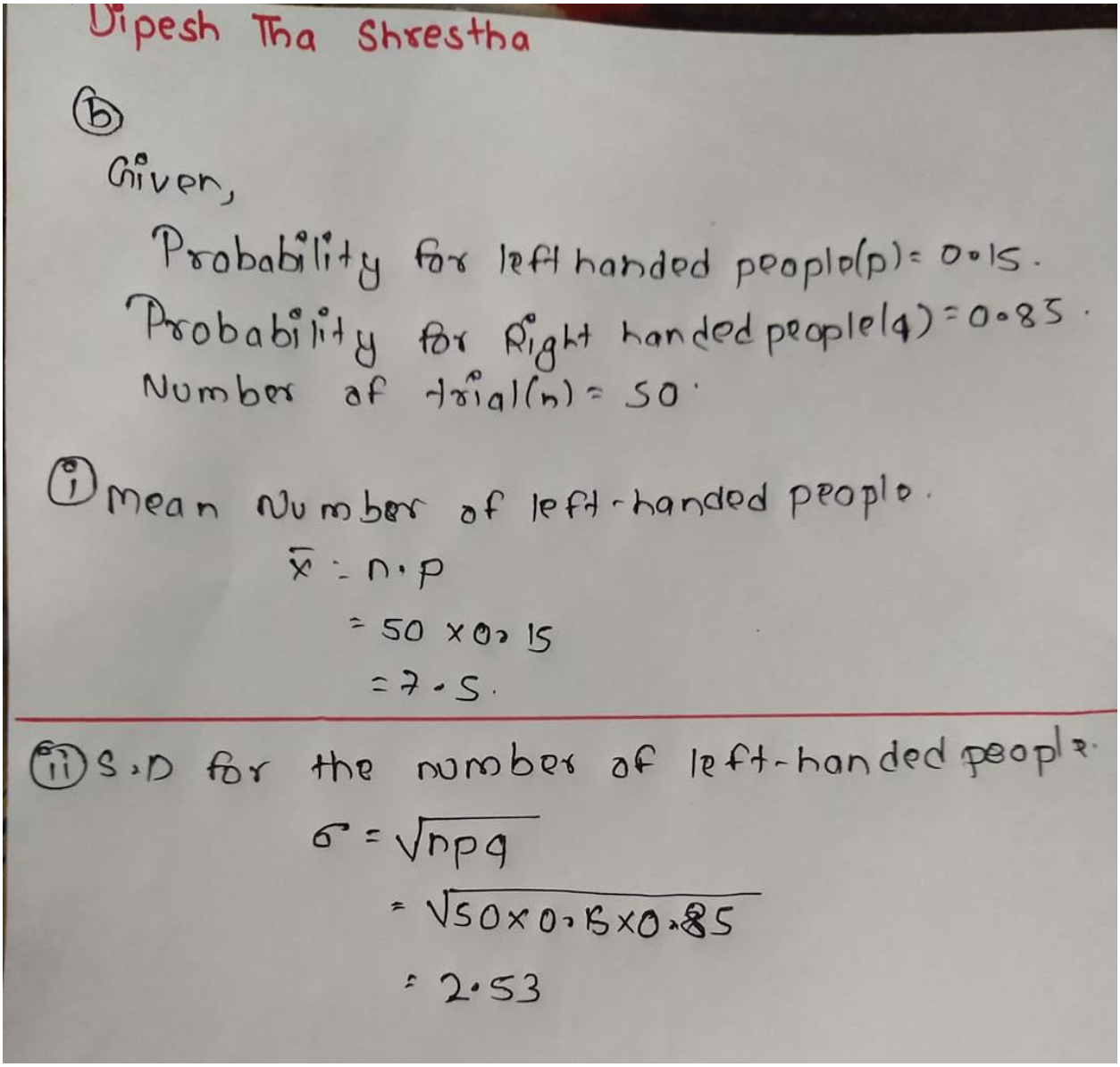
$P(r=3) = {}^{4}C_3 p^3 q^1 = 4(3(0.15)^3 (0.85) = 0.012$.

Probability that at least one of them is left handed is

$P(r \geq 1) = P(r=1) + P(r=2) + P(r=3) + P(r=4)$.

$= 0.368 + 0.098 + 0.012 + 0.0005$

$= 0.4785$//



Q.N.6

The quality control manager of certain company is inspecting batch of chocolate chip cookies that have just been baked. If the production process is in control, the average number of chip parts per cookies is 6. What is the probability that in any particular cookies being inspected,

a. At most three chip parts will be found?
b. None of the chip parts will be found?

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QNo 6.

Solution.

Average no of chip parts per cookies $= 6$

As we know,

$$P(X=r) = \frac{e^{-\lambda} \cdot \lambda^r}{r!}$$

(a)

Solution.

$r = 3$.

Now,

$$P(r \leq 3) = P(r=0) + P(r=1) + P(r=2) + P(r=3)$$

Now,

$$P(r=0) = \frac{e^{-\lambda} \cdot \lambda^r}{r!} = \frac{2.71828^{-6} \times 6^0}{0!} = 0.00248$$

$$P(r=1) = \frac{2.71828^{-6} \times 6^1}{1!} = 0.01487$$

$$P(r=2) = \frac{2.71826^{-6} \times 6^2}{2!} = 0.04462$$

$$P(r=3) = \frac{2.71826^{-6} \times 6^3}{3!} = 0.08924.$$

Then,

$$P(r \leq 3) = 0.00248 + 0.01487 + 0.04462 + 0.08924$$
$$= 0.15121$$

Therefore, Probability that in any particular cookies being inspected at most three chip parts will be found is 0.15121.//

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(b)

Solution.

$$r = 0$$

$$P(r=0) = \frac{e^{-\lambda} \times \lambda^r}{r!}$$

$$= \frac{2.71828^{-6} \times 6^0}{0!}$$

$$= 0.00248$$

∴ Therefore, Probability that in any particular cookies being inspected as none of the chip parts will be found is 0.00248//.