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SUBMITTED TO : ANWAR SHAMIM

SUBJECT : BIOSTATISTICS

SEMISTER : DT 6TH FINAL

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Q: NO 1 (a) :-

Price X	3	4	5	6	7	8	9	10	11	13
Demand	25	24	20	20	14	17	16	13	10	8

let us change the origin of x and y

Hence $U = X - 7$, and $Y = 19$

Then x xy = rux the calculation needed to find q and given in the table.

X	Y	X^2	Y^2	XY
3	25	9	625	75
4	24	16	576	96
5	20	25	400	100
6	20	36	400	120
7	19	49	361	133
8	17	64	289	136
9	16	81	256	144
10	13	100	169	130
11	10	121	100	110
13	8	169	64	104
$\Sigma = 76$	$\Sigma = 172$	$\Sigma = 670$	$\Sigma = 3240$	$\Sigma = 1148$

formual for correction:

$$r = \frac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{\{n\Sigma x^2 - (\Sigma x)^2\}\{n\Sigma y^2 - (\Sigma y)^2\}}}$$

For $n = 10$

$$r = \frac{(10)(1148) - (76)(172)}{\sqrt{\{(10)(620) - (76)^2\}\{(10)(3240) - (172)^2\}}}$$

$$r = \frac{-1592}{\sqrt{(924)(2814)}}$$

$$r = \frac{-1592}{\sqrt{2601984}}$$

$$r = \frac{-1592}{1613.06}$$

$$\boxed{r = -0.98}$$ Ans

Now $a = \frac{1}{n}\{\Sigma y - b\Sigma x\}$

$$a = \frac{1}{9}\{114 - (0.031)(135)\}$$

QNO 1:-
(B):

X	Y	X^2	Y^2	XY
20	5	400	25	100
11	15	121	225	165
15	14	225	196	210
10	17	100	289	170
17	8	289	64	136
18	9	324	81	162
21	12	441	144	252
25	16	625	256	400
28	8	784	324	504
$\Sigma 165$	$\Sigma = 114$	$\Sigma = 3309$	$\Sigma = 1604$	$\Sigma = 2099$

$$Y = a + bx$$

$$b = \frac{n\Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2}$$

$$b = \frac{(9)(2099) - (165)(114)}{(9)(3309) - (165)^2}$$

$$b = \frac{18891 - 18810}{29781 - 27225}$$

$$b = \frac{81}{2556} \rightarrow \boxed{b = 0.031}$$

$$a = \frac{1}{9}\left\{144 - 5 \cdot 115\right\}$$

$$a = \frac{1}{9}\left\{108 \cdot 8\right\}$$

$$\boxed{a = 12.09}$$ **Ans**

Hence $y = a + bx$

$$y = 12.09 + 0.031x$$

least square regression line for x on y

$$x = a + by$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum y^2 - (\sum y)^2}$$

$$b = \frac{18891 - 18810}{14436 - 12996}$$

$$b = \frac{81}{1440}$$

$$\boxed{b = 0.056}$$

Now $a = \frac{1}{n}\left\{\sum x - b\sum y\right\}$

$a = \frac{1}{9}\left\{165 - (0.1056)(114)\right\}$

$a = \frac{1}{9}\left\{165 - 6.384\right\}$

$a = \frac{1}{9}\left\{158.6\right\}$

$a = 1762$

Hence $x = a + by$

$x = 17.62 + 0.056y.$

Q.1 (B) Find the predicted values of y for $x = 20, 11, 15, 25, 28$ and x for $y = 5, 15, 9, 12, 16, 18.$

X	Y	$y = 12.09 + 0.03x$	$x = 17.62 + 0.56y$
20	5	$= 12.09 + (0.031)(20) = 12.7$	$17.62 + 0.056(5) = 17.9$
11	15	$= 12.09 + (0.031)(11) = 12.4$	$17.62 + 0.056(9) \cdot 18.4$
15	14	$= 12.09 + (0.031)(15) = 12.5$	$17.62 = 0.56(9) = 18.1$
10	17	$= 12.09 + (0.031)(25) = 12.8$	$17.62 + 0.056(16) = 18.6$
17	8	$12.09 + (0.031)(28) = 12.9$	$17.62 + 0.056(18) = 18.6$
18	9		
21	12		
25	16		
28	18		

Q.2 (A) A fair coined is tossed 5 times. Find the probabilities of obtaining various number of heads.

Answer 1: Each toss of coin has two possible outcomes, head and tail

2: The probabity of a head (success) is $p = 1/2$ and remain the same for succusive tosses

3: The succesive tosses of the coin are independent.

4: The coin is tossed times.

Therefore the r.v X which donates the number of heads (successes) has a binomial probability distribution which $p = 1/2$ and $n = 5$ the possible values of X are 0, 1, 2, 3, 4 and 5.

Hence:-

$$P(\text{no head}) = P(x=0) = \binom{5}{0}\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^5 =$$

$$1 \times \left(\frac{1}{2}\right)^5 = \frac{1}{32}.$$

$$P(1\,\text{head}) = P(x=1) = \binom{5}{1}\left(\frac{1}{2}\right)^{1}\left(\frac{1}{2}\right)^{5-1}$$

$$= 5 \times \left(\frac{1}{2}\right)^{5} = \boxed{\frac{5}{32}}$$

$$P(2\,\text{heads}) = P(x=2) = \binom{5}{2}\left(\frac{1}{2}\right)^{2}\left(\frac{1}{2}\right)^{5-2}$$

$$= 10 \times \left(\frac{1}{2}\right)^{5} = \frac{10}{32}$$

$$P(3\,\text{heads}) = P(x=3) = \binom{5}{3}\left(\frac{1}{2}\right)^{3}\left(\frac{1}{2}\right)^{5-3}$$

$$= 10 \times \left(\frac{1}{2}\right)^{5} = \frac{10}{32}$$

$$P(4\,\text{head}) = P(x=4) = \binom{5}{4}\left(\frac{1}{2}\right)^{4}\left(\frac{1}{2}\right)^{5-4}$$

$$= 5 \times \left(\frac{1}{2}\right)^{5} = \frac{5}{32}$$

and

$$P(5\,\text{head}) = P(x=5) = \binom{5}{5}\left(\frac{1}{2}\right)^{5}\left(\frac{1}{2}\right)^{0}$$

$$= 1 \times \left(\frac{1}{2}\right)^{5} = \frac{1}{32}$$

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(iv) 6 or more games

$$P(x>6) = \sum_{x=6}^{10} \binom{10}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{10-x}$$

$$= \binom{10}{6}\left(\frac{2}{3}\right)^{6}\left(\frac{1}{3}\right)^{2} + \binom{10}{7}\left(\frac{2}{3}\right)^{7}\left(\frac{1}{3}\right)^{2} +$$

$$+ \binom{10}{8}\left(\frac{2}{3}\right)^{8}\left(\frac{1}{3}\right)^{2} + \binom{10}{9}\left(\frac{2}{3}\right)^{9}\left(\frac{1}{3}\right)^{1} +$$

$$+ \binom{10}{11}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^{0}$$

$$= 0.228 + 0.262 + 0.196 + 0.087 + 0.018$$

$$P(x=6) = 0.79.$$

Q3

The following figures give the ~~number~~ number of children born to 50 women.

2	6	1	5	4	3	3	8	10	4
4	3	3	0	5	2	1	4	10	3
5	3	3	6	3	3	2	2	7	4
1	4	2	4	4	4	6	8	10	7
7	5	6	5	3	2	3	9	2	2

(a) Construct the ungrouped frequency distribution of these data.

(b) Construct the grouped frequency distribution of these data.

Solution:

Give that

(1). X_0 (minimum value) $= 0$

X_m (maximum value) $= 10$

(2) Range $= X_m - X_0$

$= 10 - 0$

$= 10$

(3) Let the nuber of classes = 06

(4) The class magnitude = $\frac{10}{7}$ = 1·5 = 2.0

⇒ **Now** (a) :- The ungrouped (discrete)

Children Born x_i	f	Tally Bar
0	1	I
1	4	IIII
2	8	~~IIII~~ IIII
3	11	~~IIII~~ ~~IIII~~ I
5	5	IIII
6	4	IIII
7	3	III
8	2	II
9	1	I
10	3	III
	50	

Now B :-

Children Borne grouped	f
0 – 1	5
2 – 3	19
4 – 5	13
6 – 7	7
8 – 9	3
10 – 11	3
	50