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Paper Bio Statistic

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Q: No 1 (a)

To Calculate Correction coefficient b/w x and y

Price x	3	4	5	6	7	8	9	10	11	13
Demand y	25	24	20	20	19	17	16	13	10	8

Let $U = x - 7$ and $V = Y - 19$ then

$\gamma_{XY} = \gamma_{UV}$, the calculation needed to find γ

X	Y	U	V	U^2	V^2	UV
3	25	-4	6	16	36	-24
4	24	-3	5	9	25	-15
5	20	-2	1	4	1	-2
6	20	-1	1	1	1	-1
7	19	0	0	0	0	0
8	17	1	-2	1	4	-2
9	16	2	-3	4	9	-6
10	13	3	-6	9	36	-18
11	10	4	-9	16	81	-36
13	8	6	-11	36	121	-66
76	172	6	-18	96	314	-176

Now

$$\gamma = \frac{\Sigma UV - (\Sigma U)^2/n}{\sqrt{\left[\Sigma U^2 - \frac{(\Sigma U)^2}{n}\right]\left[\Sigma V^2 - \frac{(\Sigma U)^2}{n}\right]}}$$

Putting values

$$= \frac{-170 - \left(\frac{6 \times -18}{10}\right)}{\sqrt{\left[96 - \frac{(6)^2}{10}\right]\left[314 - \frac{(-18)^2}{10}\right]}}$$

$$= \frac{-170 + 10.8}{\sqrt{\left[96 - \frac{36}{10}\right]\left[314 - \frac{324}{10}\right]}}$$

$$= \frac{-159.2}{\sqrt{(96 - 3.6)(314 - 32.4)}}$$

$$= \frac{-159.2}{\sqrt{92.4 \times 281.6}}$$

$$= \frac{-159.2}{\sqrt{26019.84}}$$

$$= \frac{-159.2}{161.30}$$

$$\Rightarrow \boxed{= -0.98 \text{ Ans}}$$

Q No 1 Part "B"

X	20	11	15	10	17	18	21	25	28	
Y	5	15	14	17	8	9	12	16	18	

Y on X

$y = a + bx$
and

$\Sigma Y = na + b\Sigma X$

$\Sigma XY = a\Sigma X + b\Sigma X^2$

X	Y	XY	X^2
20	5	100	400
11	15	165	121
15	14	210	225
10	17	170	100
17	8	136	289
18	9	162	324
21	12	252	441
25	16	400	625
28	18	504	784
165	114	2099	3309

Now $\bar{X} = \frac{\Sigma X}{n} = \frac{165}{9} = 18.33$

$\bar{Y} = \frac{\Sigma Y}{n} = \frac{114}{9} = 12.66$

$b = \frac{n\Sigma XY - (\Sigma X)(\Sigma Y)}{n\Sigma X^2 - (\Sigma X)^2} = \frac{9(2099) - (165)(114)}{9(3309) - (165)^2}$

$$b = \frac{18891 - 18810}{29781 - 27225} = \frac{81}{2556} = 0.03$$

and $a = 12.66 - 0.03 \times 18.33$

$a = 12.66 - 0.54$

$a = 12.12$

Hence $\hat{Y} = a + bx$

$$\boxed{\hat{Y} = 12.12 + 0.03x}$$

Now to find X on Y

$\hat{X} = a + bY$

$$\boxed{\hat{X} = 12.12 + 0.03Y}$$

To Find predicted values of Y for X

$\hat{Y} = 12.12 + 0.03(20) = \boxed{12.72}$

$\hat{Y} = 12.12 + 0.03(11) = \boxed{12.45}$

$\hat{Y} = 12.12 + 0.03(15) = \boxed{12.57}$

$\hat{Y} = 12.12 + 0.03(25) = \boxed{12.87}$

$\hat{Y} = 12.12 + 0.03(28) = \boxed{12.96}$

Q = 2 Part A

A fair is tossed 5 times. Find the probabilities of obtaining various numbers of the head.

Let us regard the tossing of a coin as an experiment, then was observe that.

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

2: The probabities of a head (sucess) is $p = 1/2$ and remain the same for successive tosses.

3: The sucessive tosses of the coin are independent.

4: The coin is tossed 5 times.

⇒ Therefore the r.v X which denotes the number of head (sucessive) has a bionomial probibility distribution with $p = \frac{1}{2}$ and $n = 5$, the possible value of X are 0, 1, 2, 3, 4 and 5 hence.

$$P(\text{no head}) = P(x=0) = \binom{5}{0}\left(\frac{1}{2}\right)^0\left(\frac{1}{2}\right)^5 = 1 \times \left(\frac{1}{2}\right)^5 = \frac{1}{32}$$

$$P(1\text{ head}) = P(X=1) = \binom{5}{1}\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^{5-1} = 5 \times \left(\frac{1}{2}\right)^5 = \frac{5}{32}$$

$$P(2\text{ heads}) = P(x=2) = \binom{5}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^{5-2} = 10 \times \left(\frac{1}{2}\right)^5 = \frac{10}{32}$$

$$P(3\text{ heads}) = P(X=3) = \binom{5}{2}\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^{5-3} = 10 \times \left(\frac{1}{2}\right)^5 = \frac{10}{32}$$

$$P(4\text{ heads}) = P(X=4) = \binom{5}{2}\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^{5-4} = 5 \times \left(\frac{1}{2}\right)^5 = \frac{5}{32} \text{ and}$$

$$P(5\text{ heads}) = P(x=5) = \binom{5}{2}\left(\frac{1}{2}\right)^5\left(\frac{1}{2}\right)^0 = 1 \times \left(\frac{1}{2}\right)^5 = \frac{1}{32}$$

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Q. No 2. B :

we observe that.

(a) There are two possible outcomes i.e A will win or will not win the game.

(b) The Probability of A's winning in each game is $p = \frac{2}{3}$

(c) The successive games are independently won or lost, and

(d) There are 10 games.

Therefore the ~~Bino~~ Binomial Probability distribution with ~~n=8~~ $n = 10$ and $p = \frac{2}{3}$ is appropriate.

let X denote the number of games won by A. then

Solution Here
Therefore the Bianomial probabity distribution
with $n = 10$

$P = 2/3$

$q = 1 - P$

$q = 1 - 2/3$

$q = \frac{3-2}{3}$

$q = \frac{1}{3}$

let x denote the number of won by A then

(i) $P(x \geq 4) = 1 - P(x < 4)$

$= 1 - \sum_{x=0}^{3} \binom{10}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{10-x}$

$= 1 - \left[\left(\frac{1}{3}\right)^{10} + 10 \left(\frac{2}{3}\right)^{1} \left(\frac{1}{3}\right)^{9} + 45 \left(\frac{2}{3}\right)^{2} \left(\frac{1}{3}\right)^{8} + 120 \left(\frac{2}{3}\right)^{3} \left(\frac{1}{3}\right)^{7} \right]$

$= 1 - \frac{1}{59049} \left[1 + 20 + 180 + 960 \right]$

$= 1 - 0.0197$

$\boxed{P(x \geq 4) = 0.9803}$

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(ii) $P(x=4) = \binom{10}{4}\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^6$

$= 210\left(\frac{16}{81}\right)\left(\frac{1}{729}\right)$

$= \frac{3360}{59049}$

$\boxed{= P(x=4) = 0.056}$

(iii) $P(x=11) = f(0) =$ because X can take only values between 0 and 10
0, 1, 2, 3, 4, — 10

(iv) 6 or more games

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

$$= \binom{10}{6}\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^4 + \binom{10}{7}\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^3 + \binom{10}{8}\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^2 + \binom{10}{9}\left(\frac{2}{3}\right)^9\left(\frac{1}{3}\right)^1 + \binom{10}{10}\left(\frac{2}{3}\right)^{10}\left(\frac{1}{3}\right)^0$$

$= 0.228 + 0.261 + 0.196 + 0.087 + 0.018$

$\boxed{= P(x\geq 6) = 0.79}$

Q=3 a Part

Ungraphed data frequency distribution

of Childrens	Tally	Frequancy
0	1	1
1	1111	4
2	𝍸 111	8
3	𝍸 𝍸 1	11
4	𝍸 111	8
5	𝍸	5
6	1111	4
7	1111	4
8	1	1
9	1	1
10	111	3
Total		50

B grouped frequancy Distribution

N = 50 Smallest value = 0

largest value = 10

Range = 10 − 0 = 10

No of classes = 1 + 3.3 log N

= 1 + 3.3 log 10

= 4.3

= 4

Class interval = $\frac{\text{Range}}{\text{No of class}}$

$= \frac{10}{4}$

= 2.5

= 2

Class interval	f	Telly	Class bondery
0 — 2	13	~~||||~~ ~~||||~~ |||	-0.5 — 2.5
3 — 5	24	~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ||||	2.5 — 5.5
6 — 8	9	~~||||~~ ||||	5.5 — 8.5
9 — 11	4	||||	8.5 — 11.5
	50		

End