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NAME

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Dep

BS: (DT)

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(1)

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Q No1

(A)

~~x y x^2 y~~

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
12	8	144	64	96
75	172	645	3246	1140

$x = 10$, $\Sigma x = 75$, $\Sigma y = 172$, $\Sigma x^2 = 645$

$\Sigma y^2 = 3246$, $\Sigma xy = 1140$

Substituting in to the computing formula for r gives

$$r = \frac{\Sigma xy - \left[(\Sigma x)(\Sigma y)\right]/n}{\sqrt{\left[\Sigma x^2 - (\Sigma x)^2/n\right]\left[\Sigma y^2 - (\Sigma y)^2/n\right]}}$$

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$$r = \frac{1140 - \left[(75)(172)\right]/10}{\sqrt{\left[645 - (75)^2/10\right]\left[3246 - (172)^2/10\right]}}$$

$$r = \frac{1140 - 1290}{\sqrt{\left[645 - 5625/10\right]\left[3246 - 2958.4\right]}}$$

$$= \frac{150}{(82.5)(2876)}$$

$$= -\frac{150}{23727}$$

$$= -0.01$$

Ans.

③

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QNo 1 (B)

Determine the equalition of the least square regression line of y on x and x on y.

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	18	784	324	504
total 165	124	3309	1604	2099

Regression line y on x

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

$$b = \frac{9(2099) - (165)(124)}{9(3309) - (165)^2}$$

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$$b = \frac{18891 - 20460}{29781 - 27225}$$

$$b = \frac{-1569}{2556}$$

$$\boxed{b = -0.6}$$

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

$$a = \frac{194 - (-0.6)(165)}{9}$$

$$= \frac{194 - (-99)}{9}$$

$$\boxed{a = 24.7}$$

Regression line x ~~avg~~ on y

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

$$b = \frac{9(2099) - (165)(194)}{9(1604) - (194)^2}$$

$$b = \frac{18891 - 20460}{14436 - 15376}$$

$$b = \pm \frac{1569}{940}$$

$$\boxed{b = 1.7}$$

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$$a = \frac{\Sigma x - b\Sigma y}{n} = \frac{165 - (1.7)(124)}{9}$$

$$a = \frac{165 - 210.8}{9}$$

$$a = \frac{-45.8}{9}$$

$$\boxed{a = -5.1}$$

Hence the required regression line is give by

$$\hat{x} = a + by$$

$$\cancel{\hat{x} = -5.1}$$

$$\boxed{\hat{x} = -5.1 + 1.7y}$$

(6)

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~~Part~~

QNo1 part B

Find the predicated value of y for x = 20, 11, 15, 25, 28. and X for y = 5, 15, 9, 12 16, 18.

$$\hat{y} = 24.7 - 0.6x$$

$$\hat{x} = 5.1 + 1.7y$$

x	y	$\hat{y} = 24.7 - 0.6x$	$\hat{x} = 5.1 + 1.7y$
20	5	12.7	3.4
11	15	18.1	20.4
25	12	9.7	15.3
28	16	7.9	22.1
	18		25.5

This is the required predicted value.

Q No 2

find the following

(A) A fair coin is tossed 5 times.
find the probability of obtaining various number of heads.

=> let us regard the tossing of a coin as experiment.
then we observe that

(i) each toss of a coin (i.e each trial) has two possible outcome, head (success) and tails (failure).

(ii) The probability of a head (success) is $p = \frac{1}{2}$ and remains the same for

Successive tosses.

(iii) The successive tosses of the coin are independent; and

(iv) The coin is tossed 5 times.

Therefore the r.v. X which denotes the number of head (successive) has a binomial probability distribution with $p = 1/2$ and $n = 5$. The possible value of X are 0, 1, 2, 3, 4 and 5, Hence

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

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

$$p(1 \text{ heads}) = p(X=1) = \binom{5}{1}\left(\frac{1}{2}\right)^1\left(\frac{1}{2}\right)^{5-1}$$

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

$$p(2 \text{ heads}) = p(X=2) = \binom{5}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^{5-2}$$

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

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

$$p(4\text{ heads}) = p(x=4) = \binom{5}{4}\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^{5-4}$$

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

$$p(5\text{ heads}) = p(x=5) = \binom{5}{4}\left(\frac{1}{2}\right)^4\left(\frac{1}{2}\right)^{5-4}$$

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

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

These probabilities can also be obtained by expanding the binomial $\left(\frac{1}{2} + \frac{1}{2}\right)^5$ The binomial probability distribution for the number of heads obtained in 5 tosses of ~~heads~~ ~~obtained in~~ a fair coin is

x	0	1	2	3	4	5
$f(x)$	$\frac{1}{32}$	$\frac{5}{32}$	$\frac{10}{32}$	$\frac{10}{32}$	$\frac{5}{32}$	$\frac{1}{32}$.

(B)

A and B play a game in which A,s probability of winning is 2/3 in a series of 10 games, What is the probability that A will win (i) at least 4 games.

(ii) Exactly equal to 4/10 games

(iii) Exactily equals to 10 games

(iv) 6 or more games.

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QNo2 part (B)

(i) $p(x > 2, y) =$

$= 1 - p(x = y)$

$= 1 - \left[\sum_{x=0} \binom{10}{x} \left(\frac{2}{3}\right)^{x} \left(\frac{1}{3}\right)^{8-x}\right]$

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

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

$\left. + \binom{10}{3}\left(\frac{2}{3}\right)^{3}\left(\frac{1}{3}\right)^{10-3}\right]$

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

$\left. + 120\left(2/3\right)^{3}\left(\frac{1}{3}\right)^{7}\right)$

$= 1 - [0.0002 + 0.0003 + 45(0.44)(0.0002)$

$+ 120(2/3)^{3}\left(\frac{1}{3}\right)^{7}]$

$= 1 - [0.0002 + 0.0003 + 45(0.44)(0.0002)$

$+ 120(0.296)(0.0005)]$

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$= 1 - [0.0002 + 0.0003 + 0.0004 + 0.012]$

$= 1 - [0.0215]$

$P(x \geq 4) = 0.97$

(ii) $P(x = 4/10) = ?$

$P(x = 4/10) = f(4/10) = 0$ because a r.v. X with a binomial distribution takes only one of the integer value $0, 1, 2, \ldots\ldots n$.

(iii) $P(x = 11) = ?$

$P(x = 11) = f(6) = 0$ because X can take only value $0, 1, 2, 3 \ldots 10$

(IV) $P(x \geq 6) = ?$

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

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

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

$\left[210\,(0.087)\,(0.019) + 80\,(0.058)\,(0.037)\right.$

$+ 45\,(0.039)\,(0.11) + 10\,(0.026)\,(0.33)$

$\left. + 1\,(0.017)\,1\right]$

$\left[0.91994 + 0.17168 + 0.195 + 0.08658\right.$

$\left. + 0.017\right]$

$P(x \geq 6) = 0.6795$.

This is the desussed solution of the probility.

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Q No3 (a):

Constract the ungrouped frequency distribution of these data.

Number	frequency	Tally
0	1	|
1	4	||||
2	8	~~||||~~ |||
3	11	~~||||~~ ~~||||~~ |
4	8	~~||||~~ |||
5	5	~~||||~~
6	4	||||
7	3	|||
8	2	||
9	1	|
10	3	|||

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

Number of groups	frequency
0 - 2	13
3 - 5	24
6 - 8	9
9 - 11	4