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Subject	***Probibility and statistics***
Assignment	*Final term*
Semester	*8th*
Submitted to	*Sir Anwar shamim*

Q No 1

Compute and analyse the results of the least Squares regression equation and Co-efficient of Correlation of Y on X for the following data. Compare your manual with the out Come of SPSS?

ID												
TEMperature	53	62	57	71	78	81	86	87	96	91	94	94
chirps per min	20	32	45	60	80	100	120	140	160	180	200	210

Solution: (i) (A) Least Square Regression Equation.

$$\bar{Y} = a + bx$$

$$a = \bar{y} - b\bar{x}$$

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

	X	Y	XY	X^2	Y^2
	53	20	1060	2809	400
	62	32	1984	3844	1024
	57	45	2565	3249	2025
	71	60	4260	5041	3600
	78	80	6240	6084	6400
ID=	81	100	8100	6561	10000
	86	120	10320	7396	14400
	87	140	12180	7569	19600
	96	160	15360	9216	25600
	91	180	16380	8281	32400
	94	200	18800	8336	40000
	94	210	19740	8836	44100
Σx=	950	ΣY= 1347	Σxy= 116989	Σx^2= 77722	Σy^2= 199549

$$\bar{x} = \frac{\Sigma x}{n} = \frac{950}{12} = 79.16$$

$$\bar{y} = \frac{\Sigma y}{n} = \frac{1347}{12} = \underline{112.25}$$

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

$$b = \frac{12(116989) - (950)(1347)}{12(77722) - (950)^2}$$

$$\boxed{b = 4.11}$$

$$a = \bar{y} - b\bar{x}$$

$$a = 112.25 - 4.11(79.16)$$

$$\boxed{a = -213.0976}$$

$$\bar{y} = a + bx$$

$$\boxed{\bar{y} = -213.0976 + 4.11x}$$

Regression line equation

(B) Co elleiat Correction γ on X.

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

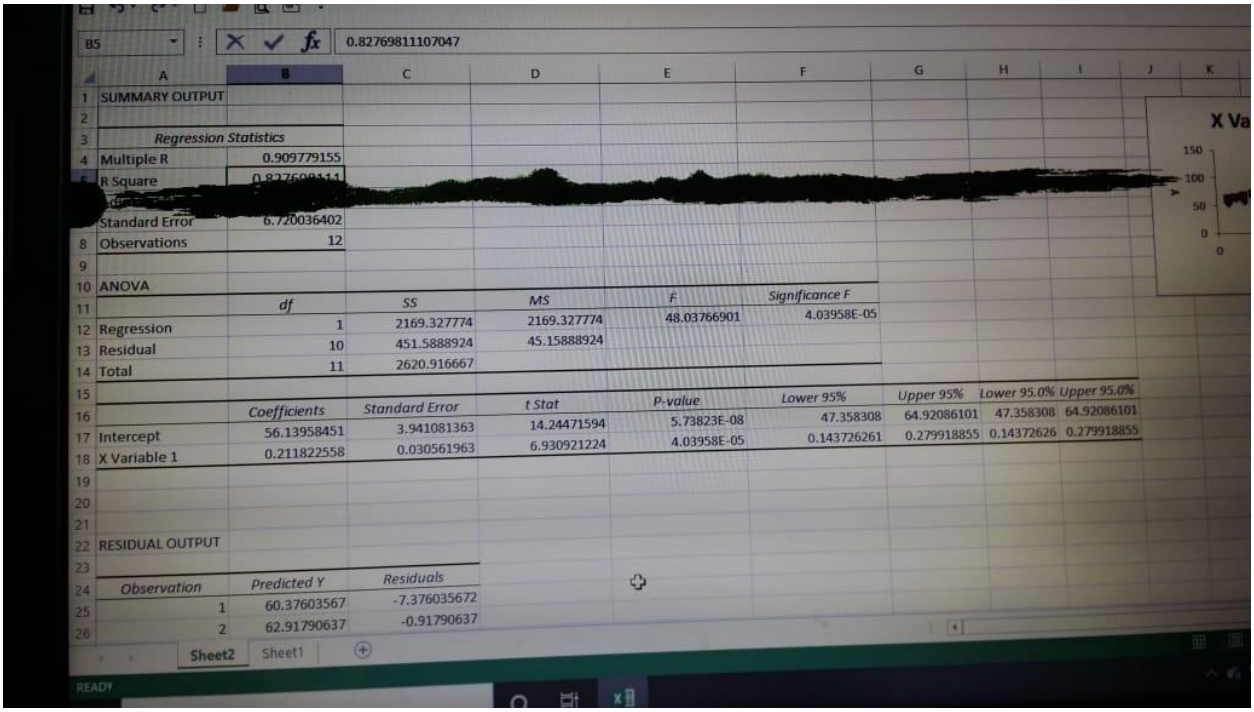
$$\gamma = \frac{12(116989) - (950)(1347)}{\sqrt{12(77722) - (950)^2\, 12(199549)(1347)}}$$

$$\gamma = \frac{12\,4218}{5.6019 \times 10^{11}}$$

$$\boxed{\gamma = 2.217 \times 10^{-7}}$$

$\Rightarrow$ Hence the estimated regression Colleient $b = 4.11$ which indicate that the value of y increase by 4.11.

Units of increase in x.



B5 | 0.82769811107047

	A	B	C	D	E	F	G	H	I	J	K
1	SUMMARY OUTPUT										
2											
3	*Regression Statistics*										
4	Multiple R	0.909779155									
5	R Square	[illegible]									
6											
7	Standard Error	6.720036402									
8	Observations	12									
9											
10	ANOVA										
11		*df*	*SS*	*MS*	*F*	*Significance F*					
12	Regression	1	2169.327774	2169.327774	48.03766901	4.03958E-05					
13	Residual	10	451.5888924	45.15888924							
14	Total	11	2620.916667								
15											
16		*Coefficients*	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*		
17	Intercept	56.13958451	3.941081363	14.24471594	5.73823E-08	47.358308	64.92086101	47.358308	64.92086101		
18	X Variable 1	0.211822558	0.030561963	6.930921224	4.03958E-05	0.143726261	0.279918855	0.14372626	0.279918855		
19											
20											
21											
22	RESIDUAL OUTPUT										
23											
24	*Observation*	*Predicted Y*	*Residuals*								
25	1	60.37603567	-7.376035672								
26	2	62.91790637	-0.91790637								

Sheet2 | Sheet1

READY

Q2

(a) ⇒ Solution:

4 – R
4 – W
5 – G
13 – balls

$$n(S) = \binom{13}{3} = 286$$

Let A = Denote all balls are of different colours.

$$n(A) = \binom{4}{1}\binom{4}{1}\binom{5}{1} = 4 \times 4 \times 5 = 80$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{80}{286} = 0.28$$

$2 \times 2 \times 2 = 8$	$3 \times 2 \times 2 = 12$	$3 \times 3 \times 2 = 18$
even x even x even = even	odd x even x even = even	odd x odd x even = even

Interpretation: There are 28% chances that all balls are of different colours.

(ii) Let B = Denote all balls of Same Colours.

Red white Green

$$n(B) = \binom{4}{3} \text{ or } \binom{4}{3} \text{ or } \binom{5}{3}$$

$$= \binom{4}{3} + \binom{4}{3} + \binom{5}{3} = 4 + 4 + 10 = 18$$

$$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{18}{286} = 0.063$$

Interpretation:- There are 6.3% chances that all balls of same colours.

Q2

(b) Solution:

2 – B
10 – G
12 – Eggs

$$n(S) = \binom{12}{4} = 495$$

Let A = denote the event that exactly one egg is bad.

$$n(A) = \binom{2}{1}\binom{10}{3} = 2 \times 120 = 240$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{240}{495} = 0.48$$

Interpretations: There are 48% chances that exactly one egg is bad.

(ii) Let B = be the event that at least one bad egg is seleted.

$$n(B) = \binom{2}{1}\binom{10}{3} + \binom{2}{2}\binom{10}{2}$$

$$= 2 \times 120 + 1 \times 45 = 240 + 45 = 285$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{285}{495} = 0.58$$

Interpretation: There are 58% chances that at least one bad egg is selected.

X

Q3

Solution:

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
81	81	81
199	37	74
36	48	52
84	13	13
29	3	4

Range = $X_m - X_0$

Range of A = $X_m - X_0$

= 199 − 6

= 193

Range of B = $X_m - X_0$

= 81 − 3

= 78

Range of C = $X_m - X_0$

= 81 − 4

= 77

BATSMAN A		BATSMAN B		BATSMAN C	
X	X^2	Y	Y^2	Z	Z^2
12	144	47	2209	15	225
15	225	12	144	23	529
6	36	76	5776	52	2704
73	5329	48	2304	4	16
7	49	4	16	24	576
81	6561	81	6561	81	6561
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 542$	$\Sigma x^2 = 61138$	$\Sigma y = 369$	$\Sigma y^2 = 20861$	$\Sigma z = 342$	$\Sigma z^2 = 18976$

BATSMAN A :-

$$\bar{x} = \frac{\Sigma x}{n} \qquad \therefore n = 10$$

$$= \frac{542}{10} = 54.2$$

$$S_x = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$$

$$= \sqrt{\frac{61138}{10} - \left(\frac{542}{10}\right)^2}$$

$$S_{\bar{x}} = 56.35$$

$$C.V = \frac{56.35}{\bar{x}} \times 100 = \frac{56.35}{54.2} \times 100$$

$$C.V = 1.03 \times 100$$

$$\boxed{C.V = 103.96}$$

BATSMAN B

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{369}{10} = 36.9$$

$$S_y = \sqrt{\frac{\Sigma Y^2}{n} - \left(\frac{\Sigma Y}{n}\right)^2}$$

$$= \sqrt{\frac{20861}{10} - \left(\frac{369}{10}\right)^2}$$

$$= 26.91$$

$$C.V = \frac{26.91}{36.9} \times 100$$

$$\boxed{C.V = 72.92\ \%}$$

BATSMAN C :

$$\bar{z} = \frac{\Sigma z}{n} = \frac{342}{10} = 34.2$$

$$S_z = \sqrt{\frac{\Sigma z^2}{n} - \left(\frac{\Sigma z}{n}\right)^2}$$

$$= \sqrt{\frac{18976}{10} - \left(\frac{342}{10}\right)^2}$$

$$S_z = 26.98$$

$$C.V = \frac{S_z}{\bar{z}} = \frac{26.98}{34.2} \times 100$$

$$\boxed{C.V = 78.88}$$

BATSMAN B is more Consistant as it value of Co-ellcent of Varience is Smallest.

Compare A with B.

$\Rightarrow$ B is Consistant.

Compare B with A

$\Rightarrow$ B is more Consistant.

Compare A with C.

$\Rightarrow$ C is more Consistant.