

MUSHTAK AKBAR

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BS MLT

Paper Bio Stat

Sem Six

Q1 (a)

Soln

$N = 10$, so $\frac{n}{N} = \frac{10}{2} = 5$

$U = X - 7$, $V = Y - 19$

and then find $\sum xy = \sum uv$.

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	94	314	-170

Sum =

$\sum = -170$ - 64 - 18

$$\gamma = -170 - \frac{6x - 18}{10}$$

$$\sqrt{\left(\frac{36 - 36}{10}\right)^2 + \left(\frac{314 - (-18)^2}{10}\right)}$$

$$\gamma = \frac{-170 + 108}{10} \left(314 - \frac{324}{10} \right)$$

$$\gamma = \frac{-1700 + 108}{10} \left(\frac{3140 - 324}{10} \right)$$

$$\gamma = \frac{-159.2}{\sqrt{(90.4)(281.6)}}$$

$$\gamma = \frac{-159.2}{\sqrt{25456.6}}$$

$$\gamma = \frac{-159.2}{159.5} = -0.998 = \boxed{-0.1}$$

Q1 (b)

x	y	xy	x ²	y ²
20	5	100	400	25
15	15	165	225	225
15	14	210	225	196
10	17	170	100	289
17	8	306	288	64
18	9	162	324	81
21	12	252	441	144
25	16	400	625	258
28	18	504	784	324
165	114	2269	3309	1604

Regression equation = \hat{y} on x

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

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

$$b = \frac{9(2269) - (165)(114)}{9(3309) - (165)^2}$$

$$= \frac{20421 - 18810}{29781 - 27225} = \frac{1611}{2556}$$

$$b = 0.63$$

1. x on y

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

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

$$b = \frac{9(2269) - (165)(114)}{9(1604) - (114)^2}$$

$$b = \boxed{1.72}$$

Thus

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

$$\hat{x} = 4.15 + 1.72y$$

$$\hat{x} = \boxed{5.27}$$

Q2: A

Let us regard the tossing of a coin as an experiment, we observe that

- (1) each toss of coin has two possible outcomes, heads and Tails
 - (2) Probability of head is $P = \frac{1}{2}$, & Vice versa
 - (3) Successive tosses of coins are independent
 - (4) Coin is tossed S times
- Therefore the r.v. X which denotes the number of head has a binomial probability distribution with $P = \frac{1}{2}$,
Therefore X are 1, 2, 3, 4, 5.

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

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

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

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

July 2019	August 2019	September 2019	October 2019	November 2019	December 2019
S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

FEBRUARY 2019

Washington's Birthday (U.S.A.)

18

MONDAY
049/316 Week 8

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

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

These probabilities can also be obtained by binomial $\left(\frac{1}{2} + \frac{1}{2}\right)^5$

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

2a(b)

Therefore the Binomial Probability distribution with $n=10$

$$p = \frac{2}{3}$$

$$q = 1 - \frac{2}{3} = \frac{1}{3}$$

$$(i) P(x \geq 4) = 1 - P(x < 4) = 1 - \sum_{x=0}^3 \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x}$$
$$\Rightarrow 1 - \left[\binom{10}{0} \left(\frac{2}{3}\right)^0 \left(\frac{1}{3}\right)^{10} + \binom{10}{1} \left(\frac{2}{3}\right)^1 \left(\frac{1}{3}\right)^9 + \binom{10}{2} \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right)^8 + \binom{10}{3} \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^7 \right]$$

$$\Rightarrow 1 - \frac{1}{59049} + \frac{10}{59049} \left(\frac{2}{3}\right) - \frac{120}{19683}$$

$$\Rightarrow 1 - \frac{1}{59049} [1 + 20 + 180 + 960]$$
$$= 1 - 0.0197 P(x \geq 4)$$
$$= 0.9803$$

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

$$= 210 \left(\frac{16}{81}\right) \left(\frac{1}{729}\right) = \frac{3360}{59043} = 0.0057$$

(iii) $P(x=1)$, $f(0)$ because X can only take numbers or value upto 10 (1, 2, ..., 10)

4) 6 or more games

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

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

$$\Rightarrow 0.228 + 0.261 + 0.196 + 0.087 + 0.048$$

$$P(x \geq 6) = 0.79$$

Q3. (a)

Ungrp data:

No	Tally marks	f	C.f
0		1	1
1		4	5
2		8	13
3		11	24
4		8	32
5		5	37
6		4	41
7		3	44
8		2	46
9		1	47
10		3	50

(B) Grp Data:

$N=50$
 $x_0=7$
 $x_m=10$

Range = $x_m - x_0 \Rightarrow 10 - 7 = 3$

$K \sim 1 + 3 \cdot 3 \log N$

$1 + 3 \cdot 3 \log(50)$

$1 + 3 \cdot 3 (1.698)$

$\approx 1 + 5.6066$

$K = 6.606 = \boxed{7}$

$h = \text{class interval} = \frac{\text{range}}{K}$

$h = \frac{9}{7} = 1.28 = \boxed{2}$

$N = 50, R = 9, K = 7, h = 2$

classes	Frequencing	class boundary	M.P
0-1	5	0.5 - 1.5	1
2-3	19	1.5 - 3.5	2.5
4-5	13	3.5 - 5.5	4.5
6-7	7	5.5 - 7.5	6.5
8-9	3	7.5 - 9.5	8.5
10-11	3	9.5 - 11.5	11

Total = $\boxed{50}$

R. frequency	R.f	C.f	R.c.f
5/50	10	5	0.1
19/50	38	24	0.5
13/50	26	37	0.6
7/50	14	44	0.8
3/50	6	47	0.9
3/50	6	50	1.0