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Programme BS:MLT

Paper Statics

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| Demand y | xy | x^2 |
|---------------|------|-------|
| 25 | 75 | 9 |
| 26 | 104 | 16 |
| 20 | 100 | 25 |
| 20 | 120 | 36 |
| 19 | 133 | 49 |
| 17 | 136 | 64 |
| | 144 | 81 |
| 16 | | |
| | 130 | 100 |
| 13 | | |
| | 110 | 121 |
| 10 | | |

$$\Sigma x = 76$$

$$\Sigma y = 174$$

$$\Sigma xy = 1156$$

$$\Sigma x^2 = 670$$

$$\Sigma y^2 = 3340$$

$$\text{Here } n = 10$$

putting these values in (1)

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

$$r = \frac{10(1156) - (76)(174)}{\sqrt{[10(670) - (76)^2][10(3340) - (174)^2]}}$$

$$r = \frac{11560 - 13224}{\sqrt{(6700 - 5776)(33400 - 30276)}}$$

$$r = \frac{-1664}{\sqrt{924 \times 3124}}$$

$$r = \frac{-1664}{\sqrt{2886576}}$$

$$r = \frac{-1664}{1664}$$

| | | |
|----|-----|-----|
| 8 | 136 | 289 |
| 9 | 162 | 324 |
| 12 | 252 | 441 |
| 16 | 400 | 625 |
| 18 | 504 | 784 |

Equation of least squares regression line of Y on X is given.

$$y = mx + b$$

Here $m =$ Slope or gradient.

$b =$ The Y intercept (where the line crosses the Y axis)

Calculate m :

$$m = \frac{N \sum XY - \sum X \sum Y}{N \sum X^2 - (\sum X)^2}$$

Putting values $N = 9$ $\sum XY = 2099$ $\sum X = 165$ $\sum Y = 114$

$$\sum X^2 = 3309$$

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

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

$$m = \frac{81}{2556}$$

$$m = 0.032$$

(b) (5)
(a)

$$\text{Now } b = \frac{\sum y - m \sum x}{N}$$

$$\text{put } \sum y = 114 \quad \sum x = 165 \quad N = 9$$

$$m = 0.032$$

$$b = \frac{114 - 0.032 \times 165}{9}$$

$$b = \frac{114 - 5.28}{9}$$

$$b = \frac{108.72}{9}$$

$$b = 12.08$$

so Equation of regression line is

$$y = mx + b$$

$$\text{put } m = 0.032 \quad \text{and} \quad b = 12.08$$

$$\boxed{y = 0.032x + 12.08}$$

y on x

⑥ Calculate regression Equation of X on Y

Regression Equation of Y on X .

$$y - \bar{y} = b_{yx} (x - \bar{x}) \text{ where } b_{yx} = \frac{N \sum xy - \sum x \sum y}{N \sum x^2 - (\sum x)^2}$$

Regression Equation of X on Y .

$$\bar{x} - \bar{x} = b_{xy} (y - \bar{y}) \text{ where } b_{xy} = \frac{N \sum xy - \sum x \sum y}{N \sum y^2 - (\sum y)^2}$$

(A)

$$\text{Pa } \sum xy = 2099 \quad \sum x = 165 \quad \sum y = 114$$

$$\sum y^2 = 1609$$

$$b_{yx} = \frac{9(2099) - (165)(114)}{9(1609) - (114)^2}$$

$$b_{yx} = \frac{18891 - 18810}{14481 - 12996}$$

$$b_{yx} = \frac{81}{1485}$$

$$b_{yx} = 0.054$$

$$b_{xy} = 0.054$$

putting values in (A)

$$x - (18.33) = 0.054 (y - 12.67)$$

$$x - 18.33 = 0.054y - 0.688$$

⑦

$$X = 0.054Y - 0.068 + 18.33$$

$$X = 0.054Y + 18.26$$

$$\boxed{X = 18.26 + 0.054Y}$$

X only

Q1

Part B find predicted values of Y for X

X = 20, 11, 15, 25, 18

putting these values in $Y = 0.032X + 12.08$

Put $X = 20$

$$Y = 0.032(20) + 12.08$$

$$Y = 0.64 + 12.08$$

$$Y = 12.72$$

Put $X = 11$

$$Y = 0.032 \times 11 + 12.08$$

$$Y = 0.352 + 12.08$$

$$Y = 12.432$$

Put $X = 15$

$$Y = 0.032(15) + 12.08$$

$$Y = 12.56$$

Put $X = 25$

$$Y = 0.032 \times 25 + 12.08$$

$$Y = 12.88$$

Put $X = 18$

$$Y = 0.032 \times 18 + 12.08$$

$$Y = 12.656$$

$$x = p_1 \cdot p_1$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

$$\text{base } x = 18$$

$$x = 18 \cdot 81 = x$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

$$\text{base } x = 18$$

$$x = 18 \cdot 81 = x$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

$$\text{base } x = 18$$

$$60 \cdot p_1 = x$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

$$\text{base } x = 18$$

$$x = 18 \cdot 23$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

$$\text{base } x = 2$$

$$81 \times 120 \cdot 0 + 25 \cdot 81 = x$$

for x to be integer
81, 121, 144, 169, 196, 225, 256, 289, 324, 361, 400, 441, 484, 529, 576, 625, 676, 729, 784, 841, 900, 961, 1024, 1089, 1156, 1225, 1296, 1369, 1444, 1521, 1600, 1681, 1764, 1849, 1936, 2025, 2116, 2209, 2304, 2401, 2500, 2601, 2704, 2809, 2916, 3025, 3136, 3249, 3364, 3481, 3600, 3721, 3844, 3969, 4096, 4225, 4356, 4489, 4624, 4761, 4900, 5041, 5184, 5329, 5476, 5625, 5776, 5929, 6084, 6241, 6400, 6561, 6724, 6891, 7060, 7231, 7404, 7581, 7760, 7941, 8124, 8309, 8496, 8685, 8876, 9069, 9264, 9461, 9660, 9861, 10064, 10269, 10476, 10685, 10896, 11109, 11324, 11541, 11760, 11981, 12204, 12429, 12656, 12885, 13116, 13349, 13584, 13821, 14060, 14301, 14544, 14789, 15036, 15285, 15536, 15789, 16044, 16301, 16560, 16821, 17084, 17349, 17616, 17885, 18156, 18429, 18704, 18981, 19260, 19541, 19824, 20109, 20396, 20685, 20976, 21269, 21564, 21861, 22160, 22461, 22764, 23069, 23376, 23685, 23996, 24309, 24624, 24941, 25260, 25581, 25904, 26229, 26556, 26885, 27216, 27549, 27884, 28221, 28560, 28901, 29244, 29589, 29936, 30285, 30636, 30989, 31344, 31701, 32060, 32421, 32784, 33149, 33516, 33885, 34256, 34629, 35004, 35381, 35760, 36141, 36524, 36909, 37296, 37685, 38076, 38469, 38864, 39261, 39660, 40061, 40464, 40869, 41276, 41685, 42096, 42509, 42924, 43341, 43760, 44181, 44604, 45029, 45456, 45885, 46316, 46749, 47184, 47621, 48060, 48501, 48944, 49389, 49836, 50285, 50736, 51189, 51644, 52101, 52560, 53021, 53484, 53949, 54416, 54885, 55356, 55829, 56304, 56781, 57260, 57741, 58224, 58709, 59196, 59685, 60176, 60669, 61164, 61661, 62160, 62661, 63164, 63669, 64176, 64685, 65196, 65709, 66224, 66741, 67260, 67781, 68304, 68829, 69356, 69885, 70416, 70949, 71484, 72021, 72560, 73101, 73644, 74189, 74736, 75285, 75836, 76389, 76944, 77501, 78060, 78621, 79184, 79749, 80316, 80885, 81456, 82029, 82604, 83181, 83760, 84341, 84924, 85509, 86096, 86685, 87276, 87869, 88464, 89061, 89660, 90261, 90864, 91469, 92076, 92685, 93296, 93909, 94524, 95141, 95760, 96381, 97004, 97629, 98256, 98885, 99516, 100149, 100784, 101421, 102060, 102701, 103344, 103989, 104636, 105285, 105936, 106589, 107244, 107901, 108560, 109221, 109884, 110549, 111216, 111885, 112556, 113229, 113904, 114581, 115260, 115941, 116624, 117309, 117996, 118685, 119376, 120069, 120764, 121461, 122160, 122861, 123564, 124269, 124976, 125685, 126396, 127109, 127824, 128541, 129260, 130081, 130904, 131729, 132556, 133385, 134216, 135049, 135884, 136721, 137560, 138401, 139244, 140089, 140936, 141785, 142636, 143489, 144344, 145201, 146060, 146921, 147784, 148649, 149516, 150385, 151256, 152129, 152996, 153865, 154736, 155609, 156484, 157361, 158240, 159121, 160004, 160889, 161776, 162665, 163556, 164449, 165344, 166241, 167140, 168041, 168944, 169849, 170756, 171665, 172576, 173489, 174404, 175321, 176240, 177161, 178084, 179009, 179936, 180865, 181796, 182729, 183664, 184601, 185540, 186481, 187424, 188369, 189316, 190265, 191216, 192169, 193124, 194081, 195040, 196001, 196964, 197929, 198896, 199865, 200836, 201809, 202784, 203761, 204740, 205721, 206704, 207689, 208676, 209665, 210656, 211649, 212644, 213641, 214640, 215641, 216644, 217649, 218656, 219665, 220676, 221689, 222704, 223721, 224740, 225761, 226784, 227809, 228836, 229865, 230896, 231929, 232964, 233999, 235036, 236075, 237116, 238159, 239204, 240251, 241296, 242344, 243395, 244448, 245503, 246560, 247619, 248680, 249743, 250808, 251875, 252944, 254015, 255088, 256163, 257240, 258319, 259400, 260483, 261568, 262655, 263744, 264835, 265928, 267023, 268120, 269219, 270320, 271423, 272528, 273635, 274744, 275855, 276968, 278083, 279200, 280319, 281440, 282563, 283688, 284815, 285944, 287075, 288208, 289343, 290480, 291619, 292760, 293903, 295048, 296195, 297344, 298495, 299648, 300803, 301960, 303119, 304280, 305443, 306608, 307775, 308944, 310115, 311288, 312463, 313640, 314819, 315996, 317175, 318356, 319539, 320724, 321911, 323100, 324291, 325484, 326679, 327876, 329075, 330276, 331479, 332684, 333891, 335100, 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701884, 703601, 705320, 707041, 708764, 710489, 712216, 713945, 715676, 717409, 719144, 720881, 722620, 724361, 726104, 727849, 729596, 731345, 733096, 734849, 736604, 738361, 740120, 741881, 743644, 745409, 747176, 748945, 750716, 752489, 754264, 756041, 757820, 759601, 761384, 763169, 764956, 766745, 768536, 770329, 772124, 773921, 775720, 777521, 779324, 781129, 782936, 784745, 786556, 788369, 790184, 792001, 793820, 795641, 797464, 799289, 801116, 802945, 804776, 806609, 808444, 810281, 812120, 813961, 815804, 817649, 819496, 821345, 823196, 825049, 826904, 828761, 830620, 832481, 834344, 836209, 838076, 839945, 841816, 843689, 845564, 847441, 849320, 851201, 853084, 854969, 856856, 858745, 860636, 862529, 864424, 866321, 868220, 870121, 872024, 873929, 875836, 877745, 879656, 881569, 883484, 885401, 887320, 889241, 891164, 893089, 895016, 896945, 898876, 900809, 902744, 904681, 906620, 908561, 910504, 912449, 914396, 916345, 918296, 920249, 922204, 924161, 926120, 928081, 930044, 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1425848, 1428259, 1430672, 1433087, 1435504, 1437923, 1440344, 1442767, 1445192, 1447619, 1450048, 1452479, 1454912, 1457347, 1459784, 1462223, 1464664, 1467107, 1469552, 1471999, 1474448, 1476899, 1479352, 1481807, 1484264, 1486723, 1489184, 1491647, 1494112, 1496579, 1499048, 1501519, 1503992, 1506467, 1508944, 1511423, 1513904, 1516387, 1518872, 1521359, 1523848, 1526339, 1528832, 1531327, 1533824, 1536323, 1538824, 1541327, 1543832, 1546339, 1548848, 1551359, 1553872, 1556387, 1558904, 1561423, 1563944, 1566467, 1568992, 1571519, 1574048, 1576579, 1579112, 1581647, 1584184, 1586723, 1589264, 1591807, 1594352, 1596899, 1599448, 1601999, 1604552, 1607107, 1609664, 1612223, 1614784, 1617347, 1619912, 1622479, 1625048, 1627619, 1630192, 1632767, 1635344, 1637923, 1640504, 1643087, 1645672, 1648259, 1650848, 1653439, 1656032, 1658627, 1661224, 1663823, 1666424, 1669027, 1671632, 1674239, 1676848, 1679459, 1682072, 1684687, 1687304, 1689923, 1692544, 1695167, 1697792, 1700419, 1703048, 1705679, 1708312, 1710947, 1713584, 1716223, 1718864, 1721507, 1724152, 1726799, 1729448, 1732099, 1734752, 1737407, 1740064, 1742723, 1745384, 1748047, 1750712, 1753379, 1756048, 1758719, 1761392, 1764067, 1766744, 1769423, 1772104, 1774787, 1777472, 1780159, 1782848, 1785539, 1788232, 1790927, 1793624, 1796323, 1799024, 1801727, 1804432, 1807139, 1809848, 1812559, 1815272, 1817987, 1820704, 1823423, 1826144, 1828867, 1831592, 1834319, 1837048, 1839779, 1842512, 1845247, 1847984, 1850723, 1853464, 1856207, 1858952, 1861699, 1864448, 1867199, 1869952, 1872707, 1875464, 1878223, 1880984, 1883747, 1886512, 1889279, 1892048, 1894819, 1897592, 1900367, 1903144, 1905923, 1908704, 1911487, 1914272, 1917059, 1919848, 1922639, 1925432, 1928227, 1931024, 1933823, 1936624, 1939427, 1942232, 1945039, 1947848, 1950659, 1953472, 1956287, 1959104, 1961923, 1964744, 1967567, 1970392, 1973219, 1976048, 1978879, 1981712, 1984547, 1987384, 1990223, 1993064, 1995907, 1998752, 2001599, 2004448, 2007299, 2010152, 2013007, 2015864, 2018723, 2021584, 2024447, 2027312, 2030179, 2033048, 2035919, 2038792, 2041667, 2044544, 2047423, 2050304, 2053187, 2056072, 2058959, 2061848, 2064739, 2067632, 2070527, 2073424, 2076323, 2079224, 2082127, 2085032, 2087939, 2090848, 2093759, 2096672, 2099587, 2102504, 2105423, 2108344, 2111267, 2114192, 2117119, 2120048, 2122979, 2125912, 2128847, 2131784, 2134723, 2137664, 2140607, 2143552, 2146499, 2149448, 2152399, 2155352, 2158307

Q.1

Binomial probability:

$$P(X=n) = \binom{n}{r} P^r (1-P)^{n-r} \text{ where } r=0,1,2,\dots,n$$

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

Solution:-

For the tossing of coin is an experiment then we observe that each one comes head and tail.

The probability of head is $P = \frac{1}{2}$ and remain the same $P = \frac{1}{2}$ for tail.

The successive tosses of the coin are independent the coin is tossed 5 times.

Therefore the r.v. X which denotes the number of the heads has binomial probability distribution with $P = \frac{1}{2}$

as 5 the possible value of

X are 0, 1, 2, 3, 4, ... and 5

hence

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

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

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

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

$$\frac{1}{5^2} = \left(\frac{1}{5}\right)^2 = \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) = (1 \times 1) \cdot 1 = (10000) \cdot 1$$

2 500 5000

Notes on average & profit "Q" & "P" :
 - Profit is at Q in terms of production & cost
 - Profit is Q in terms of cost & price
 - Profit is Q in terms of price & cost
 - Profit is Q in terms of price & cost
 - Profit is Q in terms of price & cost

old way cost also small just small
 all will for to be more
 show us prices "Q" for production
 average cost also small just small
 all will for to be more

Profit is Q in terms of production & cost
 is Q in terms of price & cost
 Profit is Q in terms of price & cost
 Profit is Q in terms of price & cost
 Profit is Q in terms of price & cost

$$\begin{aligned} & \left(\frac{1}{5}\right)^2 = \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \\ & \left(\frac{1}{5}\right)^3 = \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \\ & \left(\frac{1}{5}\right)^4 = \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \\ & \left(\frac{1}{5}\right)^5 = \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \left(\frac{1}{5}\right) \end{aligned}$$

① Exactly Equal to $\frac{4}{10}$.

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

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

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

$$P(x = 4) = \frac{10 \times 9 \times 8 \times 7 \times 6}{6 \cdot 4 \times 3 \times 2 \cdot 1} \times \frac{2^4}{3^4} \times \frac{1}{3^6}$$

$$P(x = 4) = \frac{10 \times 3 \times 7 \times 2^4}{10 \cdot 3}$$

$$P(x = 4) = \frac{3360}{59049}$$

$$P(x = 4) = 0.056$$

(17) exactly equal to 11 games

This is an impossible event As out of 10 games 11 can't be win by A

(iv) 6 or more game

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

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

$$= \frac{1}{3^{10}} \left[210 \times 2^6 + 120 \times 2^7 + 45 \times 2^8 + 10 \times 2^9 + 1 \times 2^{10} \right] \binom{10}{6} \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^{10-6}$$

$$= \frac{1}{59049} (13440 + 15360 + 11520 + 5120 + 1024)$$

$$= \frac{1}{59049} (46464)$$

$$= \frac{46464}{59049}$$

$$= \underline{0.786}$$

12. Exactly equal to 11 games

This is an impossible event as out of 10 games 11 cannot be won by A

(iv) 6 or more games

$$P(X \geq 6) = \sum_{x=6}^{10} \binom{10}{x} \left(\frac{2}{3}\right)^x \left(\frac{1}{3}\right)^{10-x}$$
$$= \binom{10}{6} \left(\frac{2}{3}\right)^6 \left(\frac{1}{3}\right)^{10-6} + \binom{10}{7} \left(\frac{2}{3}\right)^7 \left(\frac{1}{3}\right)^{10-7} + \binom{10}{8}$$

(13) (iii) Exactly Equal to 11 games

This is an impossible event

As out of 10 games 11 games can't be win

(14) 6 or more game

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

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

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

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

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

$$= 210 \left(\frac{2^6}{3^6}\right) \frac{1}{3^4} + 120 \left(\frac{2^7}{3^7} \times \frac{1}{3}\right) + \frac{120}{45} \times \frac{2^8}{3^8} \times \frac{1}{3} + \frac{2^9}{3} \times \frac{1}{3}$$

$$+ \frac{2^{10}}{3^{10}}$$
$$= 210 \times \frac{64}{729} \cdot \frac{1}{3}$$

$$= \frac{1}{3^{10}} \left(210 \times 2^6 + 120 \times \frac{2^7}{3} + 45 \times 2^8 + 10 \times 2^9 + 1 \times 2^{10} \right)$$

$$= \frac{1}{59049} \left(13440 + 15360 + 11520 + 5120 + 1024 \right)$$

14) Q No 3 Given information of Children born
50 women

| | | | | | | | | | |
|---|---|---|----|---|---|---|---|----|---|
| 2 | 6 | 1 | 5 | 4 | 3 | 3 | 8 | 10 | 1 |
| 4 | 3 | 3 | 0 | 5 | 7 | 1 | 4 | 10 | 3 |
| 5 | 3 | 3 | 6 | 3 | 3 | 2 | 2 | 7 | 4 |
| 1 | 4 | 2 | 11 | 4 | 4 | 6 | 8 | 10 | 7 |
| 7 | 5 | 6 | 5 | 3 | 2 | 3 | 9 | 2 | 2 |

Compact frequency distribution
data

$$N_0 = 50 \quad x_0 = 1 \quad x_m = 10$$

$$\text{Range} = x_m - x_0$$

$$x_m = 10$$

$$R = 10 - 1 = 9$$

Now $h = C$

$$h = 1 + 3.3 \log N$$

$$n = \frac{R}{h}$$

$$h = 1 + 3.3 \log 50$$

$$h = 1 + 3.3 (1.698)$$

$$n = \frac{9}{7}$$

$$h = 1 + 5.6066$$

$$n = 2$$

$$h = 6.6066$$



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Now we find out the information from data

$N = 50$ $R = 9$ $K = 6$ $h = 2$

| Classes | frequency | Class boundary | Mid point |
|----------------|--------------|--------------------|----------------|
| 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 = 50

| K. frequency | R. frequency | C.F | d.c.f |
|--------------|---------------------------------|-----|-------------------|
| 5/50 | $\frac{5}{50} \times 100 = 10$ | 5 | 5 5/50 |
| 19/50 | $\frac{19}{50} \times 100 = 38$ | 24 | 24/50 |
| 13/50 | $\frac{13}{50} \times 100 = 26$ | 32 | 32/50 |
| 7/50 | $\frac{7}{50} \times 100 = 14$ | 44 | 44/50 |
| 3/50 | $\frac{3}{50} \times 100 = 6$ | 47 | 47/50 |
| 3/50 | $\frac{3}{50} \times 100 = 6$ | 50 | 50/50 |
| 3/50 | | | 50/50 |