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Distribution Formulas

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List of 33 Distribution Formulas

Distribution

1) Variance in Bernoulli Distribution

Open Calculator

fx $$\sigma^2 = p \cdot (1 - p)$$

ex $$0.24 = 0.6 \cdot (1 - 0.6)$$

Binomial Distribution

2) Binomial Probability Distribution

Open Calculator

fx $$P_{\text{Binomial}} = (C(n_{\text{Total Trials}}, r)) \cdot p_{\text{BD}}^{r} \cdot q^{n_{\text{Total Trials}} - r}$$

ex $$0.00027 = (C(20, 4)) \cdot (0.6)^{4} \cdot (0.4)^{20-4}$$

3) Mean of Binomial Distribution

Open Calculator

fx $$\mu = N_{\text{Trials}} \cdot p$$

ex $$6 = 10 \cdot 0.6$$

4) Mean of Negative Binomial Distribution

Open Calculator

fx $$\mu = \frac{N_{\text{Success}} \cdot q_{\text{BD}}}{p}$$

ex $$3.333333 = \frac{5 \cdot 0.4}{0.6}$$

5) Standard Deviation of Binomial Distribution

Open Calculator

fx $$\sigma = \sqrt{N_{\text{Trials}} \cdot p \cdot q_{\text{BD}}}$$

ex $$1.549193 = \sqrt{10 \cdot 0.6 \cdot 0.4}$$

6) Standard Deviation of Negative Binomial Distribution

Open Calculator

fx $$\sigma = \frac{\sqrt{N_{Success} \cdot q_{BD}}}{p}$$

ex $$2.357023 = \frac{\sqrt{5 \cdot 0.4}}{0.6}$$

7) Variance in Binomial Distribution

Open Calculator

fx $$\sigma^2 = N_{Trials} \cdot p \cdot (1 - p)$$

ex $$2.4 = 10 \cdot 0.6 \cdot (1 - 0.6)$$

8) Variance of Binomial Distribution

Open Calculator

fx $$\sigma^2 = N_{Trials} \cdot p \cdot q_{BD}$$

ex $$2.4 = 10 \cdot 0.6 \cdot 0.4$$

9) Variance of Negative Binomial Distribution

Open Calculator

fx $$\sigma^2 = \frac{N_{Success} \cdot q_{BD}}{p^2}$$

ex $$5.555556 = \frac{5 \cdot 0.4}{(0.6)^2}$$

Exponential Distribution

10) Exponential Distribution

Open Calculator

fx $$P_{(Atleast\ Two)} = 1 - P_{((A \cup B \cup C)')} - P_{(Exactly\ One)}$$

ex $$0.5 = 1 - 0.08 - 0.42$$

11) Variance in Exponential Distribution

Open Calculator

fx $$\sigma^2 = \frac{1}{\lambda^2}$$

ex $$0.16 = \frac{1}{(2.5)^2}$$

Geometric Distribution

12) Geometric Distribution

Open Calculator

fx $P_{\text{Geometric}} = p_{BD} \cdot q^{n_{\text{Bernoulli}}}$

ex $0.002458 = 0.6 \cdot (0.4)^{6}$

13) Mean of Geometric Distribution

Open Calculator

fx $\mu = \frac{1}{p}$

ex $1.666667 = \frac{1}{0.6}$

14) Mean of Geometric Distribution given Probability of Failure

Open Calculator

fx $\mu = \frac{1}{1 - q_{BD}}$

ex $1.666667 = \frac{1}{1 - 0.4}$

15) Standard Deviation of Geometric Distribution

Open Calculator

fx $\sigma = \sqrt{\frac{q_{BD}}{p^2}}$

ex $1.054093 = \sqrt{\frac{0.4}{(0.6)^2}}$

16) Variance in Geometric Distribution

Open Calculator

fx $\sigma^2 = \frac{1 - p}{p^2}$

ex $1.111111 = \frac{1 - 0.6}{(0.6)^2}$

17) Variance of Geometric Distribution

Open Calculator

fx $$\sigma^2 = \frac{q_{BD}}{p^2}$$

ex $$1.111111 = \frac{0.4}{(0.6)^2}$$

Hypergeometric Distribution

18) Hypergeometric Distribution

Open Calculator

fx $$P_{Hypergeometric} = \frac{C(m_{Sample}, x_{Sample}) \cdot C(N_{Population} - m_{Sample}, n_{Population} - x_{Sample})}{C(N_{Population}, n_{Population})}$$

ex $$0.044177 = \frac{C(5,3) \cdot C(50-5, 10-3)}{C(50,10)}$$

19) Mean of Hypergeometric Distribution

Open Calculator

fx $$\mu = \frac{n \cdot N_{Success}}{N}$$

ex $$3.25 = \frac{65 \cdot 5}{100}$$

20) Standard Deviation of Hypergeometric Distribution

Open Calculator

fx $$\sigma = \sqrt{\frac{n \cdot N_{Success} \cdot (N - N_{Success}) \cdot (N - n)}{(N^2) \cdot (N - 1)}}$$

ex $$1.044768 = \sqrt{\frac{65 \cdot 5 \cdot (100-5) \cdot (100-65)}{\left((100)^2\right) \cdot (100-1)}}$$

21) Variance of Hypergeometric Distribution

Open Calculator

$$\sigma^2 = \frac{n \cdot N_{Success} \cdot (N - N_{Success}) \cdot (N - n)}{(N^2) \cdot (N - 1)}$$

$$1.09154 = \frac{65 \cdot 5 \cdot (100 - 5) \cdot (100 - 65)}{((100)^2) \cdot (100 - 1)}$$

Normal Distribution

22) Normal Probability Distribution

Open Calculator

$$P_{Normal} = \frac{1}{\sigma_{Normal} \cdot \sqrt{2 \cdot \pi}} \cdot e^{\left(-\frac{1}{2}\right) \cdot \left(\frac{x - \mu_{Normal}}{\sigma_{Normal}}\right)^2}$$

$$0.150569 = \frac{1}{2 \cdot \sqrt{2 \cdot \pi}} \cdot e^{\left(-\frac{1}{2}\right) \cdot \left(\frac{7 - 5.5}{2}\right)^2}$$

23) Z Score in Normal Distribution

Open Calculator

$$Z = \frac{A - \mu}{\sigma}$$

$$2 = \frac{12 - 8}{2}$$

Poisson Distribution

24) Poisson Probability Distribution

Open Calculator

$$P_{Poisson} = \frac{e^{-\lambda_{Poisson}} \cdot \lambda_{Poisson}^{x_{Sample}}}{x_{Sample}!}$$

$$0.001092 = \frac{e^{-0.2} \cdot (0.2)^3}{3!}$$

25) Standard Deviation of Poisson Distribution

Open Calculator

$$\sigma = \sqrt{\mu}$$

$$2.828427 = \sqrt{8}$$

Sampling Distribution

26) Standard Deviation in Sampling Distribution of Proportion

Open Calculator

fx $$\sigma = \sqrt{\frac{p \cdot (1 - p)}{n}}$$

ex $$0.060764 = \sqrt{\frac{0.6 \cdot (1 - 0.6)}{65}}$$

27) Standard Deviation in Sampling Distribution of Proportion given Probabilities of Success and Failure

Open Calculator

fx $$\sigma = \sqrt{\frac{p \cdot q_{BD}}{n}}$$

ex $$0.060764 = \sqrt{\frac{0.6 \cdot 0.4}{65}}$$

28) Standard Deviation of Population in Sampling Distribution of Proportion

Open Calculator

fx $$\sigma = \sqrt{\left(\frac{\Sigma x^2}{N}\right) - \left(\left(\frac{\Sigma x}{N}\right)^2\right)}$$

ex $$0.979796 = \sqrt{\left(\frac{100}{100}\right) - \left(\left(\frac{20}{100}\right)^2\right)}$$

29) Variance in Sampling Distribution of Proportion

Open Calculator

fx $$\sigma^2 = \frac{p \cdot (1 - p)}{n}$$

ex $$0.003692 = \frac{0.6 \cdot (1 - 0.6)}{65}$$

30) Variance in Sampling Distribution of Proportion given Probabilities of Success and Failure

Open Calculator

fx $$\sigma^2 = \frac{p \cdot q_{BD}}{n}$$

ex $$0.003692 = \frac{0.6 \cdot 0.4}{65}$$

Uniform Distribution

31) Continuous Uniform Distribution

Open Calculator

fx $$P_{((A \cup B \cup C)')} = 1 - P_{(A \cup B \cup C)}$$

ex $$0.08 = 1 - 0.92$$

32) Discrete Uniform Distribution

Open Calculator

fx $$P_{((A \cup B \cup C)')} = 1 - P_{(A \cup B \cup C)}$$

ex $$0.08 = 1 - 0.92$$

33) Variance in Uniform Distribution

Open Calculator

fx $$\sigma^2 = \frac{(b - a)^2}{12}$$

ex $$1.333333 = \frac{(10 - 6)^2}{12}$$

Variables Used

- **a** Initial Boundary Point of Uniform Distribution
- **A** Individual Value in Normal Distribution
- **b** Final Boundary Point of Uniform Distribution
- m_{Sample} Number of Items in Sample
- **n** Sample Size
- **N** Population Size
- $n_{Bernoulli}$ Number of Independent Bernoulli Trials
- $n_{Population}$ Number of Successes in Population
- $N_{Population}$ Number of Items in Population
- $N_{Success}$ Number of Success
- $n_{Total\ Trials}$ Total Number of Trials
- N_{Trials} Number of Trials
- **p** Probability of Success
- $P_{((A \cup B \cup C)')}$ Probability of Non Occurrence of Any Event
- $P_{(A \cup B \cup C)}$ Probability of Occurrence of Atleast One Event
- $P_{(Atleast\ Two)}$ Probability of Occurrence of Atleast Two Events
- $P_{(Exactly\ One)}$ Probability of Occurrence of Exactly One Event
- p_{BD} Probability of Success in Binomial Distribution
- $P_{Binomial}$ Binomial Probability
- $P_{Geometric}$ Geometric Probability Distribution Function
- $P_{Hypergeometric}$ Hypergeometric Probability Distribution Function
- P_{Normal} Normal Probability Distribution Function
- $P_{Poisson}$ Poisson's Probability Distribution Function
- **q** Probability of Failure
- q_{BD} Probability of Failure in Binomial Distribution
- **r** Number of Successful Trials
- **x** Number of Successes
- x_{Sample} Number of Successes in Sample
- **Z** Z Score in Normal Distribution
- **λ** Population Parameter of Exponential Distribution
- $\lambda_{Poisson}$ Rate of Distribution

- μ Mean in Normal Distribution
- μ_{Normal} Mean of Normal Distribution
- σ Standard Deviation in Normal Distribution
- σ_{Normal} Standard Deviation of Normal Distribution
- σ^2 Variance of Data
- Σx Sum of Individual Values
- Σx^2 Sum of Squares of Individual Values

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **e**, 2.71828182845904523536028747135266249
  Napier's constant
- Function: **C**, C(n,k)
  Binomial coefficient function
- Function: **sqrt**, sqrt(Number)
  Square root function

Check other formula lists

- **Distribution Formulas**

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