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Roll:- 2023

Answer to the question no-01

Weibull Distribution: The weibull distribution is a continuous probability distribution that is often used to model the time to failure of a product or system.

Geometric Distribution: The geometric distribution is a discrete probability distribution that models the number of trials required to get a success in a sequence of independent Bernoulli trials.

Applications of weibull and Geometric Distribution in simulation.

Reliability Engineering: The weibull distribution is commonly used in reliability engineering to model the time to failure of a system or product.

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Inventory Management: The geometric distribution can be used in inventory management to model the number of trials required to run out of stock.

Queueing System: Both the weibull and geometric distributions can be used to model the behavior of queueing system such as customer service lines or call centers.

Monte carlo simulation: Both the weibull and geometric distributions can be used as input distributions in monte carlo simulation.

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Answer to the Question no – 2

The chi-square goodness-of-fit test is a statistical test used to determine if a sample data matches a population or theoretical distribution.

Here are the steps for conducting a chi-square goodness-of-fit test.

1. State the null and alternative hypotheses.
2. Determine the level of significance
3. Select a sample
4. Calculate the expected frequencies
5. Compare the observed and expected frequencies
6. Determine the degree of freedom
7. Look up the critical value in a chi-square distribution table.
8. Compare the calculated chi-square statistic with the critical value
9. Draw a conclusion.

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Answer to the question no - 3

Given that

10, 12, 18, 22, 24, 30

$\beta = \frac{1}{6}(10+12+18+22+24+30)$

$= 19.33$

$f(x) = \frac{1}{\beta} e^{-x/\beta}$

$\Rightarrow x = -\beta \ln(1-q)$

$x_1 = 10 \qquad q_1 = \frac{1-0.5}{6} = 0.08 \qquad \hat{x}_1 = F^{-1}(q_1) = 1.61$

$x_2 = 12 \qquad q_2 = \frac{2-0.5}{6} = 0.25 \qquad \hat{x}_2 = F^{-1}(q_2) = 5.56$

$x_3 = 18 \qquad q_3 = \frac{3-0.5}{6} = 0.42 \qquad \hat{x}_3 = F^{-1}(q_3) = 10.52$

$x_4 = 22 \qquad q_4 = \frac{4-0.5}{6} = 0.58 \qquad \hat{x}_4 = F^{-1}(q_4) = 16.77$

$x_5 = 24 \qquad q_5 = \frac{5-0.5}{6} = 0.75 \qquad \hat{x}_5 = F^{-1}(q_5) = 26.79$

$x_6 = 30 \qquad q_6 = \frac{6-0.5}{6} = 0.91 \qquad \hat{x}_6 = F^{-1}(q_6) = 46.54$

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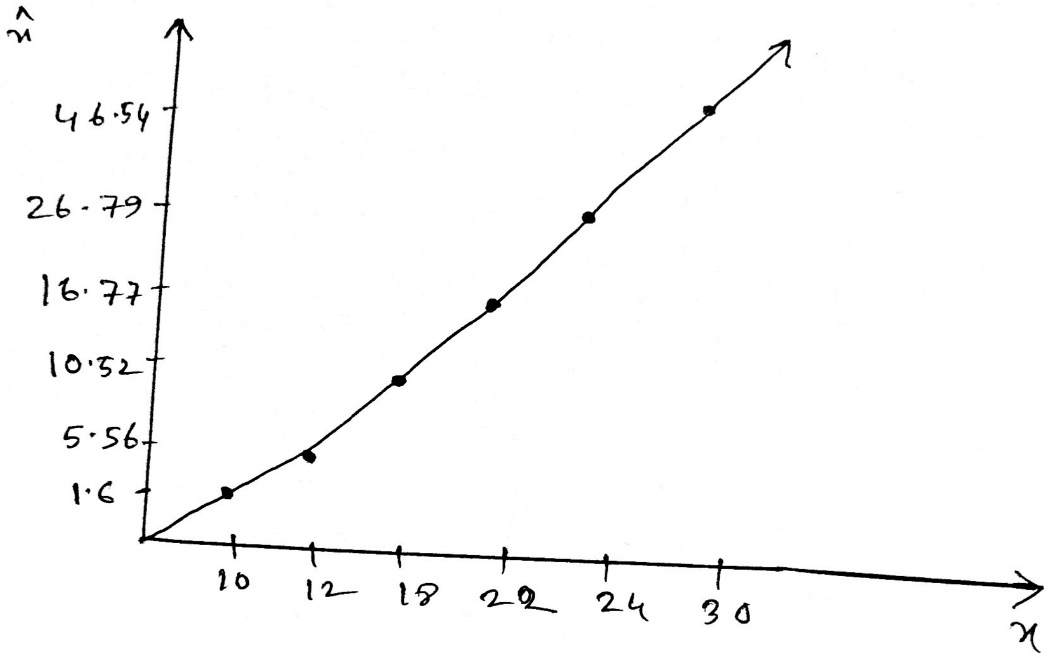

Fig: Q-Q Plots