

Indian Institute of Technology Jodhpur
Statistical Techniques (MAL7021)

Tutorial 2: Normal, Chi-square and t-Distributions

Semester II, 2019-20

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- (1) If $X \sim N(10, 36)$, then find the following probabilities:
(a) $P(X > 5)$ (b) $P(4 < X < 16)$ (c) $P(X < 20)$
- (2) A normal distribution has a mean of 25 and a standard deviation of 5. Find the proportion of area under the curve from (a) 25 to 35, (b) 26 to 28, (c) 20 to 25, (d) 18 to 24, (e) 19 to 30 (f) 24.5 to 25.7.
- (3) The lifetime of a television tube, measured in hours of use, is approximately normally distributed with a mean of 5000 hours and a standard deviation of 1000 hours. Calculate the probability that a tube will last for
(a) more than 6500 hours
(b) Between 5500 and 6500 hours
(c) Less than the expected life of a tube (5000 hours).
- (4) Manufactured items are stored in boxes which are stated to contain a weight of at least 40g. The actual weight in a box varies, being approximately normally distributed with mean 41.2g and standard deviation 0.8g.
(a) Calculate the proportion of boxes whose weight is between 40g and 42g.
(b) Calculate the weight below which 20% of boxes fall.
(c) All boxes containing less than 40g re-scraped at cost of Rs.1 per box. Calculate the scrapping cost associated with the sale of 100 boxes.
- (5) Utilizing the PDF of normal distribution with mean (μ) and variance (σ^2), show that
- $$\int_{-\infty}^{\infty} e^{-x^2/2} dx = \sqrt{2\pi} .$$
- (6) Provide bounds for $p = P(\chi_{25}^2 > 38.5)$.
- (7) Find the value of a , if $P(\chi_5^2 > a) = 0.1$.
- (8) If X is t -distributed RV with 8 degree of freedom, then find the following probabilities:
(a) $P(X \geq 1)$ (b) $P(X \leq 2)$ (c) $P(-1 < X < 1)$

-----Best of Luck-----