

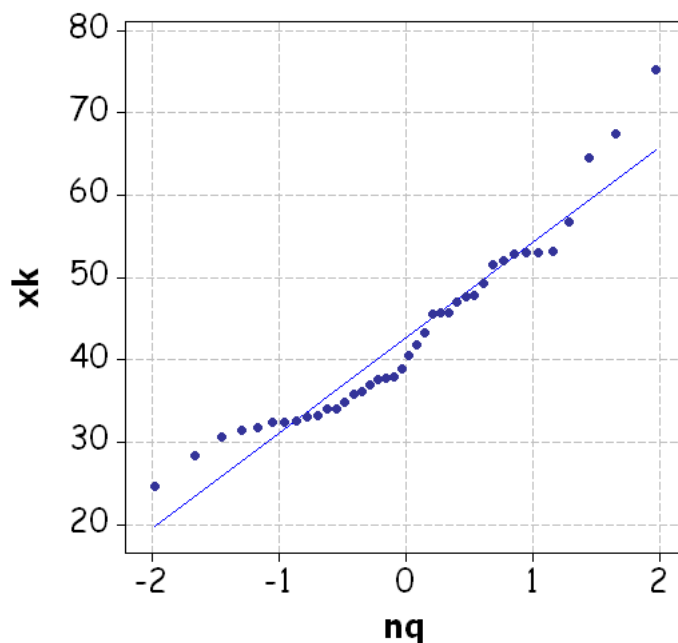
Answers

Quiz 6

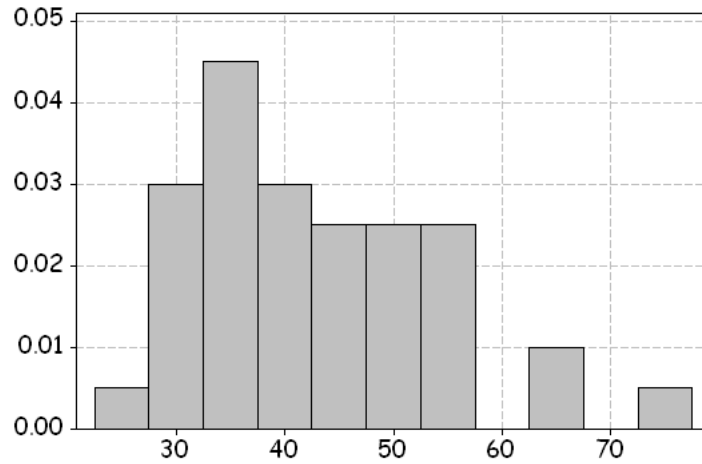
- (Q6.1) C [$\hat{\mu} = y$ -intercept = 30; so estimate of mean is 30.];
 (Q6.2) E [$\hat{\sigma} =$ slope = 10; so estimate of variance is $10^2 = 100$];
 (Q6.3) C [$\ln L = -5\theta + 10 \ln \theta$, $\frac{\partial \ln L}{\partial \theta} = -5 + \frac{10}{\theta} = 0 \Rightarrow \hat{\theta} = 2$];
 (Q6.4) B [$-\frac{\partial^2 \ln L}{\partial \theta^2} = \frac{10}{\theta^2} \Rightarrow \text{se}(\hat{\theta}) = \sqrt{\frac{4}{10}} = 0.632$];
 (Q6.5) A [definition].

Homework 6

- (6.1) C [$L = \frac{K}{\lambda^{2n}} \exp(-\frac{1}{\lambda^2} \sum x^2)$, so $\ln L = \kappa - 2n \ln \lambda - \frac{1}{\lambda^2} \sum x^2$];
 (6.2) B [$\frac{\partial \ln L}{\partial \lambda} = -\frac{200}{\lambda} + \frac{800}{\lambda^3} = 0 \Rightarrow \hat{\lambda}^2 = 4 \Rightarrow \hat{\lambda} = 2$.];
 (6.3) A [$-\frac{\partial^2 \ln L}{\partial \lambda^2} = -\frac{200}{\lambda^2} + \frac{2400}{\lambda^4} \Rightarrow \text{se}(\hat{\lambda}) = 1/\sqrt{-\frac{200}{4} + \frac{2400}{16}} = 1/\sqrt{100} = 0.1$.];
 (6.4) D [$2.40 \pm 2.5758 \times \frac{1}{\sqrt{25}} = (1.88, 2.92)$.];
 (6.5) E [$2.40 \pm 2.5758 \times \sqrt{1 + \frac{1}{25}} = (-0.23, 5.03)$.].
 (6.6) (a) i. $\bar{x} = 42.72$, $s = 11.23$.
 ii. est = 42.72, se = $\frac{s}{\sqrt{n}} = \frac{11.23}{\sqrt{40}} = 1.78$; approx 95% CI = (est \pm 2se) = (39.17, 46.27).
 iii. The QQ plot, with fitted line ($x_k = 42.72 + 11.61nq$) is shown below



This looks decidedly unstraight. It appears so be concave up, suggesting skewness: long tail at the upper end and short tail at the lower end, i.e. positive skewness. This is confirmed by a histogram or dotplot:



The Normal distribution appears not to be a good fit in this case. The approximate 95% CI will still be approximately correct. Because of the central limit theorem, \bar{X} will be close to normal. But S^2 will not be χ^2 , which makes the t-distribution questionable. However, it takes far more serious skewness to distort the the t-distribution.