KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
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STAT 502: Statistical Inference

Semester 142

Second Major Exam (Objective)

Wednesday May 20, 2015

7:00 − 7:30 pm

1. If the density function of a random variable is $f(x;\theta) = \theta e^{-\theta x}$ for $x > 0$ (with mean $\mu = 1/\theta$ and variance $\sigma^2 = 1/\theta^2$). Then 95% confidence limits for large sample size are:

(a) $\left(1 \pm \frac{1.96}{\sqrt{n}}\right)\bar{x}$ (b) $\left(1 \pm \frac{1.96}{\sqrt{n}}\right)\Big/_{\bar{x}}$ (c) $\left(\frac{1 \pm 1.96}{\sqrt{n}}\right)\bar{x}$ (d) $\left(\frac{1 \pm 1.96}{\sqrt{n}}\right)\Big/_{\bar{x}}$

(d) none of above (e) both (a) and (c) (f) both (b) and (d) (g) all of (a), (b), (c) and (d)

2. Formula for 95% confidence limits for the variance of population $N(\mu, \sigma^2)$, when μ is unknown, is:

(a) $P\left[\chi^2_{1-\alpha/2} \le \frac{ns^2}{\sigma^2} \le \chi^2_{\alpha/2}\right] = 1 - \alpha$ (b)) $P\left[\frac{ns^2}{\chi^2_{\alpha/2}} \le \sigma^2 \le \frac{ns^2}{\chi^2_{1-\alpha/2}}\right] = 1 - \alpha$

(c) $P\left[\frac{ns^2}{\chi^2_{1-\alpha/2}} \ge \sigma^2 \ge \frac{ns^2}{\chi^2_{\alpha/2}}\right] = \alpha$ (d) none of above

(e) both (a) and (b) (f) all of (a), (b) and (c)

3. Tick the quantities upon which power of the test depends:

(a) type I error (b) type II error (c) sample size

(d) sample mean (e) sample variance (f) null and alternative hypotheses

(g) population mean (h) population variance

4. While testing the equality of more than two population means, we use F statistic which is the ratio of two variances. The larger variance in this variance ratio is taken:

(a) in the denominator (b) in the numerator

(c) either way (d) none of above

5. Let X represents a random variable following $N(\mu, \sigma^2 = 4)$. The hypotheses are $H_0: \mu = 2$ against $H_1: \mu = 1/2$. A sample of size 25 is selected randomly and H_0 is rejected if sample mean is less than 1.

Then the size of type I error is equal to ____________ and the power of the test is equal to ___________.

6. Define simple and composite hypotheses. Give an example of both.

7. What is the difference between most powerful (MP) test and uniformly most powerful (UMP) test?