KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

STAT 302 Exam #1

Name: _____ ID#: _____

Useful Results:

I. If Y has a gamma distribution with parameters α and β, then the density and moment generating function of Y are $\frac{1}{\Gamma(\alpha)\beta^{\alpha}} y^{\alpha-1} e^{-\frac{y}{\beta}} \quad y > 0$, and $(1-\beta t)^{-\alpha}$ respectively.

II. If $Z_1, Z_2, \cdots Z_n$ are iid standard normal random variables then $\sum_{i=1}^{n} Z_i^2$ has a χ^2 distribution with n degrees of freedom.

1. Find the expected value of an F random variable with ν_1 and ν_2 degrees of freedom.

2. $Y_1, Y_2, \cdots Y_n$ is a random sample from $N(\mu, \sigma^2)$. Show that the sample variance $(n-1)S^2/\sigma^2$ has a χ^2 distribution with $n-1$ degrees of freedom.

3. Y_1, Y_2, Y_3 is a random sample from a distribution with the density $f_Y(y) = e^{-y}\ y > 0$. Find the expected value of the sample median.