MATH 611

Homework 1

1. If and c is a constant such that show that the random variable

is exponentially distributed with parameter c.

1. If are iid random variables, show that the random variable has a Gamma distribution with parameters n and k, that is, .
2. Exercise 2.2 on page 45 of the textbook (Robert and Casella-R&C).
3. Use R to generate a pair of standard normal random variables (of size n=1000 each) using the Box-Muller transformation. For each variable construct a normal QQ-plot and a density plot.
4. Use R and simulation to ‘prove’ the CLT: Pick a non-normal discrete or continuous probability model and generate 100 samples, each of size n=35 from this distribution.
5. Derive the sampling distribution of the mean by showing its 5-number summary and standard deviation. Are the mean and standard deviation in agreement with what you would expect from the CLT?
6. Create a normal QQ-plot for the sampling distribution of the mean. What do you conclude?