

## Econ 311: Problem Set #5

**Due: Monday, December 8, 2008**

**Q.1** What is a simple random sample?

**Q.2** What is the Central Limit Theorem?

**Q.3** Given a population with mean  $\mu = 400$  and variance  $\sigma^2 = 1,600$ , the central limit theorem applies when the sample size  $n \geq 25$ . A random sample of size  $m = 35$  is obtained.

**a** What are the mean and variance of the sampling distribution for the sample means?

**b** What is the probability that  $\bar{x} > 412$ ?

**c** What is the probability that  $393 \leq \bar{x} \leq 407$ ?

**d** What is the probability that  $\bar{x} < 389$ ?

**Q.4** According to the Internal Revenue Services, 75% of all tax returns lead to a refund. A random sample of 100 tax returns is taken.

**a** What is the mean of the distribution of the sample proportion of returns leading to refunds?

**b** What is the variance of the sample proportion?

**c** What is the standard error of the sample proportion?

**d** What is the probability that the sample proportion exceeds 0.8?

**Q.5** Monthly rates of return on the shares of a particular common stock are independent of one another and normally distributed with a standard deviation of 1.7. A sample of 12 months is taken.

**a** Find the probability that the sample variance is less than 2.5.

**b** Find the probability that the sample variance is more than 1.0.