Quiz 4 for Statistics 301  
Elementary Statistical Methods - Spring 2000  
Material Covered: Chapter 7 of Workbook and text  
For: Friday, 10th March

Name (please print): ___________________________ last first

Let \( X \) be a random variable that represents white blood cell count per cubic millimeter of whole blood. Assume that \( X \) has a distribution that is normal with mean \( \mu = 7500 \) and estimated standard deviation \( \sigma = 1750 \). A test result of \( X < 3500 \) is an indication of leukopenia.

(a) [1] The probability that on a single test \( X \) is less than 3500 is ___________________________.

(b) [1] Suppose a doctor uses the average \( \bar{X} \) for two tests taken about a week apart?

\[ P(\bar{X} < 3500) = \] ___________________________.

(c) [1] Suppose a doctor uses the average \( \bar{X} \) for three tests each taken about a week apart?

\[ P(\bar{X} < 3500) = \] ___________________________.

(d) [1] As the sample size increases, the variance of the average of a random sample (circle one) decreases / remains the same / increases / is unknown.

(e) [1] As the sample size increases, the expected value of the average for a random sample (circle one) decreases / remains the same / increases / is unknown.

(f) [1] Compare and contrast simulation and the central limit theorem.
(a) \[1\] 0.011

(b) \[1\] 0.000613

(c) \[1\] 0.0000377

(d) \[1\] decreases

(e) \[1\] remains the same

(f) \[1\] Both simulation and the central limit theorem are used to approximate sampling distributions. However, whereas simulation provides a numerical approximation to the actual distribution of any statistic from a random sample, the CLT provides an analytical approximation to the normal distribution for the average of a random sample.