INTRODUCTORY STATISTICS TEST NUMBER 4

Question 1: (20 points)

Calculate the sampling distribution of the mean for a sample of n = 2 from the following population distribution.

x:	0	1	2
$P(x)$:	.10	.15	.75

Calculate the mean and standard deviation of the sampling distribution of the mean for samples of n = 10 and n = 100.

Question 2: (15 points)

The central limit theorem says that, regardless of how the population is distributed, the observations in a sample will be approximately normally distributed if the sample size is large enough. True or false? Explain briefly.

Question 3: (15 points)

Define the following terms involved in statistical inference:

a) estimator

b) estimate

c) unbiasedness

d) consistency

e) efficiency

Question 4: (25 points)

Suppose that an individual has $14,000 to invest and decides to put $1000 in each of 14 stocks picked at random from a large group listed on the local stock exchange. The mean return of the stocks in the group is 10% per year and the variance of the returns of the stocks in the group is 4% per year.

a) Calculate the expected return and variance of the 14 stock portfolio.

b) Calculate a 90% confidence interval for the portfolio return.

c) How many stocks would the portfolio have to contain (assuming an equal $ investment in each stock) to ensure that the variance of the portfolio return will be less than 10 basis points—i.e., less than 1/10 of one percent?

d) How many stocks would be required to ensure that the portfolio return will be within 10 basis points of the mean you estimated above for 90% of such porfolios selected.

e) Calculate a 90% prediction interval for the return to an additional stock, selected at random, to be added to the portfolio.

Question 5: (10 points)

We want to calculate the proportion of Ontario voters who would vote for Mike Harris, if he were to run for election again, to a degree of accuracy of ± 1 percentage point, 19 times out of 20. How big a sample will we need?

Question 6: (15 points)

The mean and standard deviation of the last 25 babies born at Sunnybrook Hospital is 6 pounds and 1.2 pounds, respectively. Construct and interpret a 95% prediction interval for the next baby born.