E370 Exam 1 practice spring 2010 Prof. W. E. Becker

I. (15 pts) The four accounting supervisors for your firm downloaded the following national data on quartile and median pay for their job classification:

Accounting Supervisor	25th%ile	Median	75th%ile
the United States	**$50,017**	**$57,744**	**$66,306**

From Excel they learn that their median salary is $55,000 (based on their salaries of $50, $50, $60 and $70, in thousands). They argue that because their median salary is $2,744 below the national average they should each be receiving $2,744 more in salary. As their overseeing executive vice-president, what is your response based on the statistics they have presented? (If their use of statistical information is appropriate and reasonable, state why. If their use of statistics is faulty or questionable, provide alternative statistical information as needed.)

II. (19 pts) An article in the *WSJ* reported that unionized hourly employees in the United States worked an average (mu) 46.6 hours per week, with an implied standard deviation (sigma) of 5.2 hours for a bell shaped (normal) distribution of hours worked.

A. If a worker is randomly drawn from this distribution of hours worked, what is the probability that his or her weekly work time will be greater than 51.8 hours?
B. For a random sample of nine workers drawn from this distribution of hours worked, what is the expected value of the sample mean?
C. For a random sample of nine workers drawn from this distribution of hours worked, what is the standard deviation of the sample mean?
D. What is the standard error of the mean for a sample of nine workers drawn randomly from this distribution of hours worked?
E. For a random sample of nine workers drawn from this distribution of hours worked, what is the probability that the sample mean will be greater than 51.8 hours?

III. (19 pts) According to articles in the Fort Wayne *Journal Gazette* (May 26, 2003) and the *Indiana Daily Student* (5- 29- 2003, p. 3), “three out of five (school bus drivers, on average) have at least one traffic violation on their records.” Assuming this is true,

A. what is the probability of randomly selecting six school bus drivers, from the 21,000 current and former school bus drivers in Indiana, and finding three who have at least one traffic violation?
B. what is the probability of randomly selecting six school bus drivers, from the 21,000 current and former school bus drivers in Indiana, and finding at least three who have at least one traffic violation?
C. what is the expected number of school bus drivers in a random sample of six school bus drivers, drawn from the 21,000 current and former school bus drivers in Indiana, who have at least one traffic violation?
D. for a random sample of six school bus drivers, drawn from the 21,000 current and former school bus drivers in Indiana, what is the standard deviation of the distribution of school bus drivers who have at least one traffic violation?
E. What did you have to assume to answers parts A through D?

IV. (19 pts) Use the following information in parts A through E.

The following three investments are available to you at a cost of $1,000 per attempt. The net return for each investment is distributed normally and independently of the other investments, with the indicated expected net returns and standard deviations. Investment C is formed by placing $500 in A and $500 in B.

Investment A	Investment B	Investment C
μ =$99	μ = $135	μ = ????
σ = $33	σ = $54	σ = ????

A. The expected net return for Investment C is _______ (show work or give reason)
B. The standard deviation for Investment C is _______ (show work or give reason)
C. If you have the ability to repeatedly buy into only one Investment (either A, B or C), then which investment should yield you the most money in the "long term"? and why?
D. Which investment has the highest potential to yield you the most money in one and only one attempt? and why?
E. Which investment has the highest likelihood of yielding a negative net return? (Show relevant probability)

V. (28 pts) For the next four questions, circle the most correct answer.

1. The coefficient of variation is bounded by what numerical values?

   A. zero and positive one
   B. zero and positive infinity
   C. negative infinity and zero
   D. negative and positive one
   E. negative and positive infinity

2. The summation of deviation in observed values around their mean is calculated as $\sum_{i=1}^{n}(x_i - \bar{x})$, and

   A. when divided by *n*-1 the sample standard deviation results.
   B. when squared and then divided by *n*-1 the sample variance results.
   C. is positive provided all of the *x*'s are positive.
   D. is smaller the larger the sample mean.
   E. is zero.

3. When will the P($X \geq 20$) = P($X > 20$)?

   A. If *X* is a continuous random variable.
   B. If *X* is a discrete random variable.
   C. If the mean of *X* is greater than 20.
   D. If the mean of *X* is less than 20.
   E. If the distribution of *X* is symmetric, with an expected value of 20.

4. As the sample size increases, the distribution of

A. the sample approaches the normal.
B. the sample mean goes to that of the population.
C. the expected value of the sample mean becomes more normal.
D. the sample mean becomes more normal and collapses on the population mean as n goes to infinity.
E. the sample means acquires a mean of zero and unit variance, which is the standard normal distribution.

5. An article in the *WSJ* stated that the mean price for new homes in the United States was $196,900 and the median price was $160,000. If 49 homes are randomly drawn from the population of new homes, then the expected value of the mean is

A. $178,450, which is the mean for our measures of central tendency.
B. $196,900 and the distribution of the sample mean would be approximately normal by the central limit theorem.
C. $196,900, but the distribution of the sample mean could not be approximately normal because the median of the sampling distribution would be $160,000.
D. $160,000 because the distribution of the sample mean would be approximately normal, with about 50 percent of its values above and 50 percent below $160,000.
E. Unknown because its value depends on the actual values drawn in the sample and the sample is too small a portion of the population to infer anything from the population.

6. The distribution of a point estimator is a density function (or histogram) of the

A. random values used to calculate an estimate from one observed sample of size n.
B. hypothetical or possible values of the estimator for all random samples of size n.
C. random values from n samples, where each sample is of like size and equally likely.
D. most likely values in n samples, where each random sample is of like size n.
E. sample of n random values, which is approximately normal if n is sufficiently large.

7. If Y is a normal random variable with mean of 30 and standard deviation of 10, then

A. $P(Y = 30) = 0$.
B. $P(Y = 30) = 1.0$.
C. P(Y = 30) = NORMDIST(30,30,10,0) = 0.039894.
D. P(Y = 30) = NORMDIST(30,30,10,1) = 0.500000.
E. $P(0 < Y < 30)$ = NORMDIST(30,30,10,1) = 0.500.

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pp. 99-101.
pp. 172-173
p. 200.
p. 270.

