qbs120_ps4_corrections_gibran

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Question 1

a) my original solution was correct.
b) my original solution was correct.
c) my original solution was correct.
d) my original solution was correct.

Question 2

a) my original solution was correct.
b) my original solution was correct.

Question 3

Optional

Question 4

a) my original solution was correct.
b) my original solution was correct.
c) my original solution was correct.
d) my original solution was correct.
e) my original solution was correct.
f) my original solution was correct.
g) my original solution was correct.
h) my original solution was correct.

Question 5

(Based on Rice, Chapter 7, Problem 4) Two populations are surveyed with simple random sampling. A sample of size n_1 is used for population I, which has a population standard deviation of σ_1; a sample of size $n_2 = 3n_1$ is used for population II, which has a population standard deviation of $\sigma_2 = 2\sigma_1$.

a) Ignoring the finite population correction, in which of the two samples would you expect the estimate of the population mean to be more accurate? Provide a mathematical justification for your answer.

Based on the Law of Large Numbers, the best estimate of the population mean μ is the sample average, $\bar{X}$. The variance of $\bar{X}$ (i.e., the variance of its sampling distribution) is:

$$Var(\bar{X}) = \frac{\sigma^2}{n}$$

The most accurate variance estimate will be the estimate whose sampling distribution has the smallest variance.

Ignoring the finite population correction, the variance of the estimate for population I is:

$$Var(\bar{X}_1) = \frac{\sigma^2}{n_1}$$

and the variance of the estimate for population II is:

$$\begin{aligned} Var(\bar{X}_2) &= \frac{(s\sigma_1)^2}{3n_1} \\ &= \frac{(4\sigma_1)^2}{3n_1} \\ &= \frac{(4}{3}\ Var(\bar{X}_1) \end{aligned}$$

Therefore, the estimate for μ for population I is more accurate than the estimate of μ for population II.

b) my original solution was correct.
c) my original solution was correct.

Question 6

my original solution was correct.

Question 7

a) my original solution was correct.
b) my original solution was correct.
c) my original solution was correct.
d) my original solution was correct.

Question 8

Optional