Tutorial 4

T4 – 1. To assess the hardness of a lot of 2,000 castings, ten castings are obtained by equiprobable selecting (EPS) from the lot; the measured hardnesses are as follows (in units called B.I.D., *Brunell Impression Diameter*):

4.3 4.6 4.5 4.2 4.4 4.3 4.4 4.3 4.2 4.3.

(a) Find an approximate 95% confidence interval for the average hardness of this lot of castings.

(b) Explain briefly why a confidence interval is a useful way to present the results of this investigation.

(c) Discuss the factors that affect the width of the confidence interval; distinguish clearly between factors that are under the control of the person doing the selecting and factors that are not.

T4 – 2. A telephone sample survey is planned to investigate the opinions of University of Waterloo Co-op. students on their job placement process. The target population is the 4,505 students currently on their work terms. One of the questions asks whether or not a student is satisfied with the current system, and a goal of the sample survey is to estimate **Ᵽ**, the population proportion who would answer *Yes* to this question.

(a) For students obtained by EPS, what sample size would you recommend so that, 19 times out of 20, **Ᵽ** would be estimated to within 5 percentage points? Show your reasoning clearly.

(b) With*out* doing the calculations, explain briefly how the question is altered if the specification of precision is estimating **Ᵽ** to within 5%.

***T4 – 3.** A city planning commission, using an up-to-date listing of all addresses in the city, will obtain, by EPS, 300 addresses for a sample survey of adults residing at these addresses. The number of adults living at each address may be zero, one, two, or more than two.

(a) Suppose that, when a selected address contains more than one adult, one of those adults is obtained by EPS for inclusion in the sample survey and the other adults at the address are *ex*cluded. Assuming no non-response, explain why this procedure does *not* constitute equiprobable selecting from the study population of all the adults in the city.

(b) Alternatively, suppose that *all* the adults living at the 300 selected addresses will be included in the sample survey. Assuming no non-response, explain why this procedure does *not* constitute equiprobable selecting from the study population of all the adults in the city.

 *Bonus question

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