Weekly Homework I
Survey Methodology I
Due date: **November 29, 2023**

1. For each of the following design decisions, identify which error source might be affected. Each design decision can affect at least two different error sources. Write short (2-4 sentences) answers to each point.

   a) The decision to use repeated calls persuading reluctant respondents in a customer satisfaction survey for a household product manufacturer.

   b) The decision to increase the number of questions about assets and income in a survey of income dynamics, resulting in a lengthening of the interview.

   c) The decision to include prisons and hospitals in the sampling frame for a study of consumer expenditures.

   d) The decision to change from a face-to-face interview design to a mailed questionnaire mode in a household survey of illegal drug usage.

2. A medical practice has records for N=830 patients. A simple random sample of n=273 was selected and 174 of the sample patients had private health insurance:

   a. Estimate the % of patients with private health insurance and the standard error.
   b. Calculate a 97% confidence interval for the population % and provide an interpretation. What are the advantages and disadvantages of using a 95% or 88% confidence interval instead?
   c. The study is to be repeated in another medical practice that has N=1150 patients. A standard error of 2.5 percentage points for the sample % of patients with private health insurance is required. What sample size is needed for a simple random sample to achieve this level of precision? For planning purposes, assume that the population percentage is 50%.

3. An organization has requested your assistance in designing a sample to estimate the proportion of engaged employees. The organization has provided data on the number of employees in four different types (A, B, C, D) based on the year 2023, as well as previous estimates of the proportion of engaged workers. These estimates were obtained from a survey conducted in 2021, which included 50 interviews per employee type, totaling 200 employees. The organization has allocated a budget to interview 300 employees. The executives are particularly concerned about the low engagement within group C (operation managers) and would like to prioritize maximizing the precision of the analysis for that specific group, to conduct additional analysis to understand factors influencing engagement within that group.

	Number of employees (2023)	**Proportion Engaged (2021)**
A	121	0.83
B	536	0.72
C	343	0.51
D	2642	0.32

Propose and justify a sample design for this problem specifying:

a. How many employees to interview by type.
b. Compute design weights if necessary.
c. MOE for the whole sample.
d. MOE only for group C.