Discuss Matrix Representations of Problems (Assign 3)

Review: Simple mean model, no response error

deterministic
stochastic

Review: Examples and Practice

1. Suppose there is no response error, and age is recorded for \( N \) subjects in a population.
   i. Define the population mean and variance.
   ii. Represent using vectors and matrices:
       all ages
       the population mean and variance

2. Suppose pulse is measured on subject ‘s’ immediately after exercise, one minute, and 2 minutes after exercise.
   i. Write a simple linear model that relates pulse to time for subject ‘s’
   ii. Write a quadratic model that relates pulse to time for subject ‘s’
   iii. Suppose that pulse does not change over time. Write an appropriate model for subject ‘s’
   iv. Express these models using vectors and matrices.
   v. Repeat the examples for a randomly selected subject.

SRS without replacement

Representation

In-Class Exercise

- pass out sets of 4 pieces of paper
- How would you represent a random ‘selection’ of one subject?

(see SRS-example1.xls)

\( U_{is} = 1 \) if subject \( s \) is the \( i^{th} \) selected subject

\( = 0 \) otherwise

Selection of a subject:

\[
Y_i = \sum_{s=1}^{N} U_{is} y_s
\]

\[
Y_i = \begin{pmatrix} U_{i1} & U_{i2} & \cdots & U_{iN} \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{pmatrix} = U'Y
\]