Lecture 4

STAT 109: Introductory Biostatistics

Lecture 4

Random babies, what are the chances?

The purpose of this activity is to practice to computing a probability using brute force math (a.k.a "careful counting")

Note: this activity was developed by Allen Rossman and Beth Chance of Cal Poly, SLO. You can see their write-up here.

Story

Suppose that four mothers gave birth to four babies at a hospital and that the we decide to prank the mothers by randomly pairing the babies with mothers.

What is the probability that all four mothers will get their own baby? Only three mothers? Two? One? None?

Mathematics

1. List the sample space of the experiment of four babies being randomly returned to their mothers.
2. Count the number of outcomes that correspond to the event all four mothers get their own baby
3. Count the total number of ways four babies could be returned to mothers
4. Compute the probability that all four babies are correctly returned, assuming they are randomly returned so each possible pairing in the sample space is equally likely.
5. Compare your exact answer in part 4 with the estimate from the simulation shown in class: Random Babies (rossmanchance.com)
6. Repeat 2 and 4 for the events of exactly 0, 1, 2, or 3 mothers getting the correct baby.