MA231 – Spring 2009 Homework 5 Due 3/13/2009
a.k.a. Homework Edgeworth

Homework Policies: You should give a brief and concise explanation for each question. Just writing down an answer with no explanation is usually not sufficient. If the homework requires output from Stata, incorporate that output into your written assignments. Homework is due at the *beginning* of class on the day indicated.

(1) M & M 3.26, page 193

(2) M & M 3.56, page 208

(3) An experiment on health care is to be carried out to see whether the amount of coverage that insurance companies provide has an effect on the amount of health care that people seek, and whether it has an effect on a person's health. Four insurance plans (treatments) are to be compared that pay 0%, 50%, 75%, or 100% of all costs below a certain threshold (all costs over this threshold are covered).

A. Outline the design of a randomized experiment suitable for this study.

B. Describe *briefly* the practical and ethical difficulties that might arise in such an experiment.

(4) A researcher for *Consumer Reports* is interested in comparing the effectiveness of two dandruff shampoos. One possibility is to use a simple randomized design that assigns shampoo A to 10 subjects and shampoo B to another ten subjects. An alternative is a matched pairs design that assigns shampoo A to ten subjects the first week, and then assigns shampoo B to the same ten subjects the second week. Compared to the simple randomized design, what is the major advantage and disadvantage of the matched pairs design? How could this disadvantage be rectified?

(5) A statistician has twins and her minister calls her to ask her if he should baptize the babies. She tells him, "Baptize one, but not the other. That way I have a control." What type of experimental design is this? What could you say about the relative merits of this design when the twins are fraternal (non-identical) versus when they are identical?

(6) M & M 3.61, page 209

(7) M & M 3.63, page 210

(8) M & M 3.64, page 210

(9) M & M 3.65, page 219

(10) M & M 3.83, page 221

(11) M & M 3.95, page 224

(12) Consider a population containing only 5 students. Listed below are the exam scores for these 5 students.

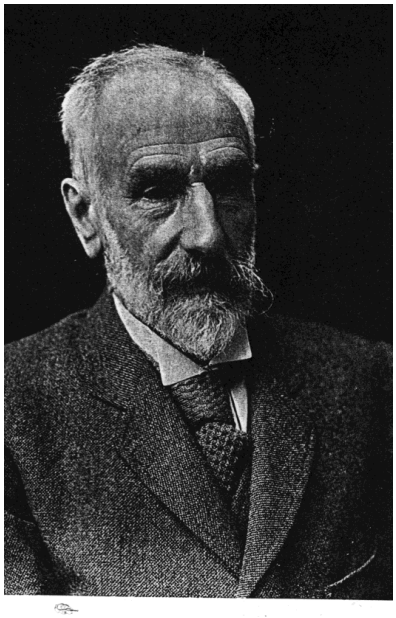
Bob	40
Carol	60
Mary	60
Jack	80
Alice	100

a) What is the mean exam score in the population?

b) Construct the sampling distribution (by hand) for the sample mean when SRS's of size n = 3 are drawn from the population. (There are 10 possible samples of size 3). For each sample, write out the names of the students, the 3 exam scores, and calculate the mean of the sample exam scores. Make a histogram of the sampling distribution and comment on its general shape.

c) Calculate the center of the sampling distribution obtained in part (b) in terms of the mean (rather than the median). How does the result that you have obtained compare to (a) and provide a very brief explanation for what you have found.

Famous Statistician of the Week



FRANCIS YSIDRO EDGEWORTH, F.B.A.

Who is this dude?

Francis Ysidro Edgeworth
1845-1926

Why is he cool (or not so cool)?

Francis Edgeworth came to study statistics after an education in ancient and modern languages. He entered Trinity College, Dublin at the age of 17 and studied French, German, Spanish and Italian. After graduating, he was awarded a scholarship to study at Oxford and he entered Exeter College in January 1867. At Oxford he spent some time at Magdalen and at Balliol, graduating in 1869.

Exactly what Edgeworth did in the years after leaving Oxford is unclear. He must have studied law at some time since he was called to the Bar in 1877. Three years later, however, he was lecturing in logic at King's College, London. In 1888 he was appointed Professor of Political Economics at King's College, London and, two years later, he was appointed to the Tooke chair of Economic Science.

In 1881 he published Mathematical Psychics: An Essay on the Application of Mathematics to the Moral Sciences. This work, really on economics, looks at the Economical Calculus and the Utilitarian Calculus. He formulated mathematically a capacity for happiness and a capacity for work. His conclusions that women have less capacity for pleasure and for work than do men would not be popular in the 1990's.

Courtesy of *http://www.shsu.edu/~icc_cmf/bio/edgeworth.html*