

Bus 273: Statistical Analysis for Business

Fall 2011

PROBLEM SHEET # 8

Problem 1: Statistical arguments are increasingly being used in legal issues. Here is an example. AMEG is a big company with 10000 employees, of which 4100 are women. AMEG's top management consists of a group of 10 people.

- a) Assume that the 10 top managers are randomly chosen from the set of all 10000 employees. What is the probability that there is
- no woman
 - at most one woman
- in the top management?
- b) Now suppose that there is indeed not a single woman in the top management of AMEG. What is your conclusion?

Problem 2: Consider the following game. A fair coin is flipped, and the player receives a payoff of \$ 2^k if the first head appears on the k th flip. Let the random variable X denote the payoff. What is a fair price for this game? (A fair price is such that the expected payoff minus the price equals 0.) — This problem is known as the St. Petersburg paradox.

Problem 3: A random variable R has a probability distribution as follows:

$$P(R = r) \begin{array}{c|cccc} r & 0 & 1 & 2 & 3 \\ \hline & 2k & 3k & 13k & 2k \end{array}$$

Compute $P(R < 2.0)$.

Problem 4: A business evaluates a proposed venture as follows. It stands to make a profit of \$10,000 with probability $3/20$, to make a profit of \$5,000 with probability $9/20$, to break even with probability $1/4$ and to lose \$5,000 with probability $3/20$. Compute the expected profit in dollars.

Problem 5: The weight of eggs and the hatching (*yumurtalama*) time of chicks are important issues in poultry farming.

- a) The weight of eggs (measured in grams) from hens of a certain age has a normal distribution with mean 57.8 and standard deviation 3.2. Give an interval which will cover the weight of about 95% of these eggs.
- b) What share of eggs will be expected to have a weight above 60 grams?
- c) In a sample of 100 eggs, the first chicks hatched after an incubation (*kuluçka*) time of 450 hours, the last after 504 hours. Assuming that hatching time is approximately normally distributed, determine the standard deviation and the variance of hatching time. Also mention the unit of measurement of standard deviation and variance in this case.