

Bus 273: Statistical Analysis for Business

Fall 2009

PROBLEM SHEET # 6

Problem 1: The result of an elementary analysis of monthly returns (end of month closing quotations) in percent on the Chinese stock index SSE (Shanghai Securities Exchange Center) in the period from January 2000 through October 2008 (105 observations) is:

arithmetic mean, \bar{r}	0.83	minimum	-20.31
variance, s^2	67.96	lower quartile	-4.68
standard deviation, s	8.24	median	0.81
skewness, γ_1	0.03	upper quartile	5.57
kurtosis, γ_2	0.76	maximum	27.45

- What does the three-sigma-rule say in this case?
- Give a rough sketch of the distribution of monthly returns, which reflects the parameters given in the table.

Problem 2: Rolling a die. Consider the events $A = \{1, 3, 5\}$ and $B = \{1, 2, 3, 4\}$.

- Show that A and B are independent if the die is fair.
- Show that A and B need not be independent if the die is biased.

(This problem shows that the independence of events is a *probabilistic* property.)

Problem 3: In the following problem, assume that a year has 365 days, and that people's birthdays are uniformly distributed over the year.

- Compute the probability that at least two of the 11 players of a football team have the same birthday. (Hint: First compute the probability that all 11 players have a different birthday.)
- How many people will at least have to get together in order to have a 50:50 chance that at least two of them have the same birthday?
- Compute the probability that at least two students in a class of 50 have the same birthday.

(These and similar problems are known as the *birthday problem*.)

Problem 4: It is known that 60% of all customers of SORGIM supermarkets prefer to pay with credit card. Compute the probability that the next five customers *all* prefer to use their credit cards. (Hint: Introduce a suitable random variable and find its distribution first.)