6. Exercise

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Problem 1: Output data analysis

Why is determining the required number of tellers for a bank different from determining the hardware requirements for a computer or communications systems?

Problem 2: Output data analysis

For each of the following distributions, derive formulas for the MLEs of the indicated parameters. Assume that we have IID data $X_1, X_2, \ldots, X_n$ from the distribution in question.

a) $U(0, b)$, MLE for b

b) $U(a, 0)$, MLE for a

c) $U(a, b)$, joint MLEs for a and b

Problem 3: Confidence interval

Construct a 95 percent confidence interval for $\mu_w = \mu_x - \mu_y$ given the following data.

$X = \{3.06, 2.79, 2.21, 2.54, 9.27, 3.09, 2.5, 0.31, 3.17, 0.98\}$
$Y = \{3.81, 3.37, 2.61, 3.59, 11.02, 3.75, 2.84, 0.71, 3.94, 1.18\}$

Let $W_j = X_j - Y_j$ and $m = n = 10$.

Is the confidence interval statistically significant?

Problem 4: Evaluation of simulation models

For each of the systems described below, under what circumstances would it be appropriate to use a terminating simulation versus a steady-state simulation to analyze the system?

a) A walk-in medical clinic simulated to determine staffing levels.

b) A portfolio of stocks, bonds, and derivate securities simulated to estimating the long-run return.

c) A path over a set of internet routers connecting two hosts A and B to estimate the throughput.

d) A data-center to store all data of an institute which is accessed by n hosts to evaluate the

e) A large local area network (LAN) with n hosts and k switches in tree/star-topology to estimate the throughput.

f) The Internet to estimate the throughput of any pairs of source-destination.

Problem 5: Simulation models, reading

Download the paper »On the Accuracy of MANET Simulators« by David Cavin, Yoav Sasson, and Andre Schiper from the website of the class.

Discuss the paper and the findings of the authors. What are their main findings?