KTH Matematik

Home assignment 1, January 2009, in SF2862 Stochastic decision support models

Examiner: Krister Svanberg, *krille@math.kth.se*.
This home assignment should be carried out in groups of at most two students.
The problems may be discussed with other groups, but each group should, on their own and with their own words, write a *short* report where the obtained results are presented, including the rate diagrams and balance equations. The code used for the numerical calculations (Matlab is recommended) should be attached to the report.
A paper version of your report should be handed in to Mikael Fallgren or Krister Svanberg, not later than **February 2, 2009 at 16.00**.
Write your name, "personnummer" and e-mail address on the front page of the report.
Some groups may (partly by random) be seleced to give an oral presentation to the teachers. Read your e-mail to check if you are selected.
If the solutions and presentation are adequate, you get 2 bonus points to the final exam.

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1. Consider, on page 791 in Hillier and Lieberman, the
"Finite queue variation of the $M/M/s/$ model, called the $M/M/s/K$ model".
Assume that $s = 1$ (a single server), $K = 4$, $\lambda = 2$ and $\mu = 3$.
Draw a rate diagram and formulate the balance equations.
Solve these equations numerically and calculate L, L_q, W and W_q.

2. Consider the corresponding $M/E_2/1/4$ model with λ and μ as above.
The service times are now assumed to have an Erlang distribution
with mean $1/\mu$ and shape parameter $k = 2$ (see page 798).
Draw a rate diagram and formulate the balance equations.
Solve these equations numerically and calculate L, L_q, W and W_q.

3. Consider the corresponding $E_2/M/1/4$ model with λ and μ as above.
The interarrival times are now assumed to have an Erlang distribution
with mean $1/\lambda$ and shape parameter $k = 2$.
Draw a rate diagram and formulate the balance equations.
Solve these equations numerically and calculate L, L_q, W and W_q.

4. Consider the corresponding $E_2/E_2/1/4$ model with λ and μ as above.
Draw a rate diagram and formulate the balance equations.
Solve these equations numerically and calculate L, L_q, W and W_q.

5. Play around with other values on λ and μ, both $\lambda < \mu$ and $\lambda > \mu$.
Are there values for which the four models give significantly different results?