Home assignment 2, February 2009, in SF2862 Stochastic decision support models

Examiner: Krister Svanberg, *krille@math.kth.se*.
This home assignment should also 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, not later than **February 19, 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 the stochastic inventory model on the first pages of the excerpt from the 6th edition of Hillier and Lieberman, which can be found on the course homepage ("Background for home assignment 2").
Assume the following data, where the notation follows the excerpt:
$a = 100$ units per week.
$K = 2000$ kr.
$p = 40$ kr per unit.
$h = 1$ kr per unit per week.
$\lambda = 1$ week.
Further assume that the demand D during the lead time has a uniform distribution on the interval $[\,0.7\,a\lambda,\ 1.3\,a\lambda\,]$.

Calculate optimal values of Q and s, using the iterative method described on the top of the fourth page in the excerpt.

2. A reasonable modification of the model is obtained by the following arguments:

At the end of a cycle the expected *inventory level* is $s - a\lambda$,
while the expected *inventory on hand* is $E(s-D)^+$.
At the beginning of a cycle both the expected inventory level and the expected inventory on hand are $Q + s - a\lambda$.

Hence, the expected average inventory on hand during a cycle is

$$\frac{Q + s - a\lambda + E(s-D)^+}{2}\text{, instead of }\frac{Q + s - a\lambda + s - a\lambda}{2}.$$

Deduce the corresponding algorihm and calculate optimal values of Q and s.

(Note: It may be interesting to compare your obtained formulas with the model without backlogging described on the last page of the excerpt.)