Homework 5

due Tuesday, November 8, 2016

1. [20 points] Prove that the EUE $\%$ and the LOLP function for the simulation period $T$ are related by

$$\frac{d\%}{dC_N} = -LOLP[C_N] \cdot T$$

2. [40 points] Using the linear programming framework for the modeling of an energy storage device, derive the economic criterion:

$$\frac{\lambda_c}{\lambda_g} \leq \eta_s = \eta_g \eta_c \eta_t$$

3. [40 points] Develop the expression for the expected energy $\tilde{E}_j^c$ that can be used for charging an energy storage plant when

(i) $j$ is the first block of a three-state unit

(ii) $j$ is an additional block of a two-state unit whose first block was already loaded
4. **Bonus Question [200 points]**: This question is aimed as a team assignment and in effect this is a research question and there may be multiple answers.

Modify the algorithm for the simulation of a single storage plant to **extend** its capability to allow the simulation of multiple storage plants. You need to **provide** the steps, **justify** the logic proposed and **indicate** that the scheme takes into account all the constraints on each storage unit. In particular, **show** that the scheme reduces to the method given in the notes the case of a single storage unit.