

Exercise 4.1.

Consider a generating unit characterized by the data in the table below

Capacity/minimum output (MW)	200/45
Ramping up/down limits (MW/h)	40/60
Cost = $a + b \cdot PG + c \cdot PG \cdot PG$	$a=5; b=10; c=0.1$
Initial production (MW)	100

The considered scheduling horizon spans 6 hours. The day-ahead price is described by the scenarios contained in the table below

t1	t2	t3	t4	t5	t6	Prob
12	21	14	28	13	22	0.3
21	18	15	23	28	19	0.4
17	18	10	29	26	15	0.3

Knowing that selling offers have to be submitted to the market without knowing the prices:

- Write the optimization problem to determine the optimal self-scheduling strategy that maximizes the expected profit of the generating unit and solve it. Provide both the expected profit and the optimal self-scheduling.
- Solve the same optimization problem imposing that the profit, under any price realization, has to be higher than 1200. Provide both the expected profit and the optimal self-scheduling.
- Compare the results obtained in a) and b).