Problem 1.

Write a Matlab simulation testbed for minimum operating cost for the system below.

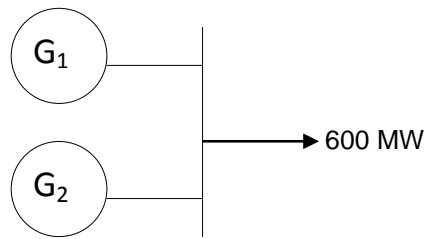Fig1 Power System

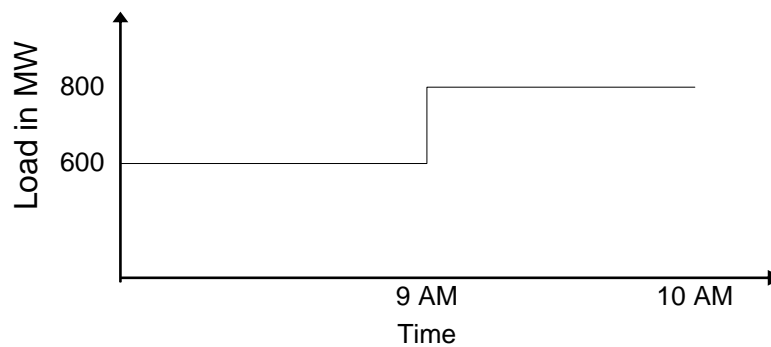
Fig 2 Load schedule

Generator 1

P_{Min} = 80 MW

P_{Max} = 400 MW

Production Cost: $F_1(P_1) = 150 + P_1 (2.00 + 0.00125 P_1)$ $ / hr

Incremental cost

$$\lambda_1 = \frac{dF_1(P_1)}{dP_1} = 2.0 + 0.0025P_1 \ \$/hr$$

Fuel Price: 30 ¢ / MBTu

Generator 2

$P_{Min} = 60$ MW

$P_{Max} = 600$ MW

Production Cost: $F_2(P_2) = 100 + P_2 (2.3 + 0.0015 P_2)$ \$ / hr

Incremental cost

$$\lambda_2 = \frac{dF_2(P_2)}{dP_2} = 2.3 + 0.003 P_2 \ \$/hr$$

Fuel Price: 32 ¢ / MBTu

Your report should consist of the following:

1. Summary of theoretical analysis.

2. Solution steps

3. Analysis of your the results

Appendix Your Matlab codes

Problem 2.

Write a Matlab simulation testbed for the power system load schedule below. Compute the minimum operating schedule. Consider a power station consisting of two generators serving a load. The minimum and maximum generation limits are 80 MW and 400 MW ($80 \leq P_G \leq 400$) for unit # 1 and 60 MW and 300 MW ($60 \leq P_G \leq 300$) for unit # 2 respectively.

The production cost of each unit is:

$$F_1(P_1) = 150 + P_1 (2.00 + 0.00125 P_1) \ \$ / hr$$
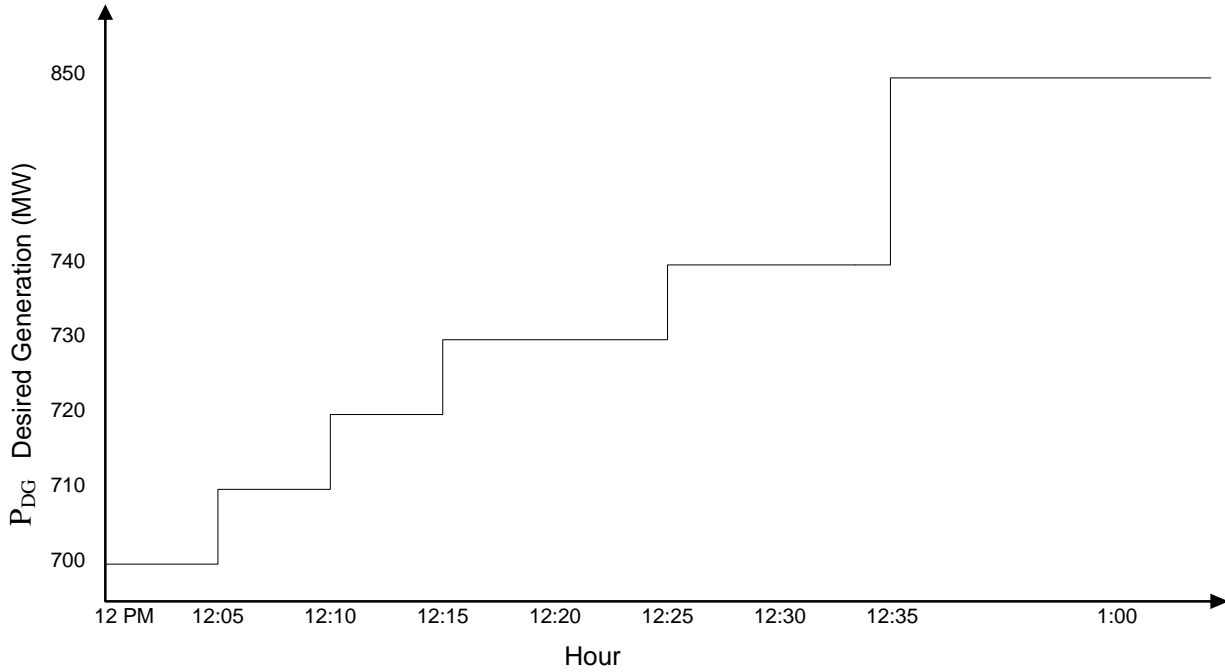$$F_2(P_2) = 100 + P_2 (2.3 + 0.0015 P_2) \ \$ / hr$$

Fig 3 Load schedule

Your report should consist of the following:

1. Summary of theoretical analysis.

2. Solution steps

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Appendix Your Matlab codes

Problem 3.

Write a Matlab simulation testbed for the power system given below to perform the following:
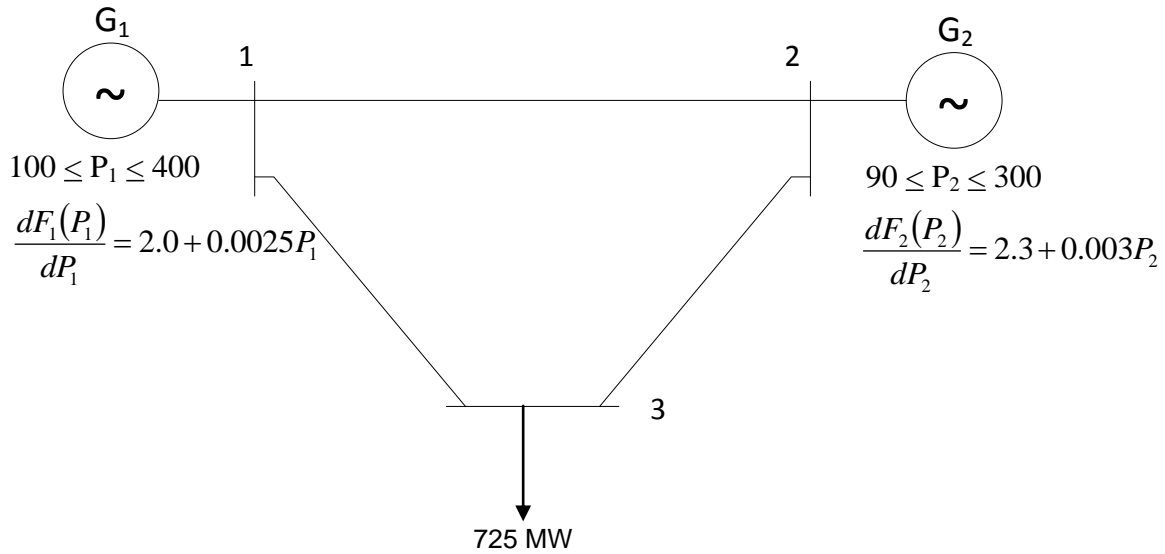
Fig 4 Power System

Suppose the formula is given by: $P_L = (6.7\ P_1^2 + 3.3\ P_1\ P_2 + 6.3\ P_2^2) \times 10^{-5}$

1) Find the base point loading for each generator to satisfy the load of 610 MW by neglecting the effect of losses.

2) By taking power system losses into consideration

Your report should consist of the following:

1. Summary of theoretical analysis.

2. Solution steps

3. Analysis of your the results

Appendix Your Matlab codes