B18041CS
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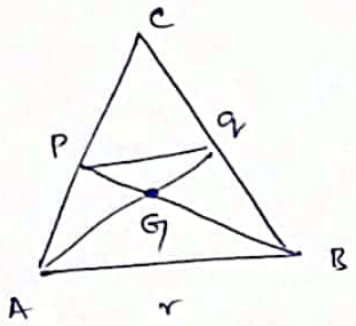
Q2) 3 cities are located at vertices of an equilateral triangle.

Inorder to minimise the total distance from the airport, the location has to be centroid of the triangle.



P, Q → mid points of AC, BC respectively.

$PQ \parallel AB \cdot \frac{1}{2}$

PQ joins mid points of AC, BC.

ΔPQG similar to ΔBGA.

$$\frac{QG}{GA} = \frac{PQ}{AB} = \frac{1}{2}$$

$$\Rightarrow QG = \frac{1}{2} AG$$

$$\Rightarrow QG = \frac{1}{3} AG.$$

→ Assume that axes of coordinate of 2 cities lie in (0,0) (0,a) $(a/2, 3^{1/2}a/2)$.

Suppose city 1 airport is at (x,y).

Then we can now formulate NLP ie. non linear modelling

problem into

$$= \min \left((x^2+y^2) + (x^2+(y-a)^2) + \underbrace{\left((x-a/2)^2 + \left(y-\sqrt{3}/2\, a/2\right)^2\right)}_{\text{This should be minimised.}} \right)$$