Task 2.2

Methodology

In task 2.2, it is requested to find the lowest cost with the condition of four constrains and six variables. It is given that the total of the product of cost of fuel per kg and trip fuel with the product of time related cost per minute of flight and trip time should be greater or equal to 25. The sum of cost of fuel per kg and time related cost per minute of flight, sum of trip fuel and trip time, and sum of cost of fuel consuming area and time consuming area should be greater or equal to 10, respectively. Since all the variables are positive integers, by logic, keeping the result of the inequalities to minimum can keep the cost lowest. The cost of fuel per kg, time related cost per minute of flight , trip fuel and trip time is restricted by the sum of product of both cost of fuel per kg with trip fuel and time related cost per minute of flight with trip time. While sum of cost of fuel consuming area and time-consuming area is independent from it. In order to get the lowest cost, for the cost of fuel per kg, time related cost per minute of flight , trip fuel and trip time, in both the combination of sum of two integer equals to 10, product of smaller integer of cost of fuel per kg and the larger integer of trip fuel plus the product of larger integer of time related cost per minute of flight and the smaller trip time, or reverse. After finding the value of different variables, the program will the compute the lowest cost of the flight.

Result

There are two case for the result. The first result will be both cost of fuel per kg and trip time equals 2 while both trip fuel and time related cost per minute of flight equals 8. The second case will be the reverse of case one. Both cost of fuel per kg and trip time equals 8 while both trip fuel and time related cost per minute of flight equals 2. The integer of cost of fuel consuming area and cost of time-consuming area is 1 and 9, respectively, or reverse

Discussion

Originally, 1 is input in both cost of fuel per kg and trip time while 9 is input in both trip fuel and time related cost per minute of flight in order to get the lowest cost. However, it is discovered that the sum of product of cost of fuel per kg and trip time and product of trip fuel and time related cost per minute is 18, which is smaller than 25. The result cannot satisfy the inequality, as a result, the value of smaller integer increased by one while the larger integer decreased by one in other to fulfill of the inequalities and get the lowest cost.

Also, according to the general equation of total cost given in task 2.2, it shows that the cost of fuel consuming area and cost of time-consuming area have no direct relationship to the total cost. We have discussed this question among the group and come up to a conclusion that these two answer have no contribution to the total cost so we decided to input any two numbers that add up equals to 10 will satisfy the equation. However, when different combination is tried to input into the code, it shows that the combination of 1 and 9 actually gives a smaller cost compared to other combination. Firstly, we concluded that the explanation of the result is by try and error. However, after searching the given information in slide, another equation was discovered, showing that how a grid of fuel-consuming area and time consuming area is calculated. The pattern is similar to the total cost equation. Same theory is adopted when calculating the cost of fuel-consuming area and time-consuming (a lager cost of fuel per kg time a smaller trip fuel and fuel consuming area, a smaller time related cost per minute of flight times a larger trip time and time-consuming area). This finally give a smallest cost value.