# Management Science

# BM04BAM

# Group Assignment

# Group 20

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### Question 1.

* 1. Below is the mathematical notation for the integer program used to express the problem of maximizing profit for GWA.

, , , , 0

= Large size plane (200 people)

* Explain the meaning of every group of constraints. Anything else missing?

#### 1.2. Data preparation in GUROBI (Figure 1):

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Figure 1

#### Implementing the proposed model in GUROBI (Figure 2 & 3):

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Figure 2

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Figure 3

#### 1.4 Analysing the solution by using GUROBI:

1. *Figure 4* provides information on the daily profits of GWA (optimal value) which is at **$3,459325.6.**
2. Additionally, *figure 4* indicates the number of types of planes that are used. The optimal number of planes to use would thus be **614 small planes**, **833 medium sized planes**, and **313 large planes**.

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Figure 4

1. The daily revenue as well as daily cost can be seen below in *figure 5,* which indicates that the daily revenues of GWA stand at **$15,737833.1,** whereas the daily costs stand at **$12278507.5**
2. Calculating the profit margin of GWE (daily revenues–daily costs/daily revenues), further indicates that the profit margin of GWA stands at **22% (0.219).** The value is shown in *figure 5* respectively.

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Figure 5

1. The Utilization of the allocated capacity that GWA uses is calculated and indicated in *figure 6.* According to the calculations, GWA can allocate **97,8%** (0.977) of its capacity, when considering the capacity of small, medium, as well as large planes.

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Figure 6

1. Finally, the percentage of lost demand that GWA is seeing is indicated in the calculations in *Figure 7.* According to the calculations, the percentage of lost demand stands at around **9,9%** (0.0994).

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Figure 7

### Question 2