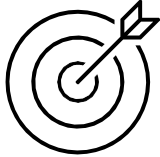




SEMESTER PROJECT: Airport terminal building design



Aim: Design the terminal building of Barcelona El Prat airport, considering several aspects. While doing that you will realize how different concepts you have learned during KHAS 112 comes together and how useful the math is.

Steps:

1) At

<https://wwwssl.aena.es/csee/Satellite?SiteName=Estadisticas&anyo=2015&c=Page&cid=1144247795704&pagename=Estadisticas%2FEstadisticas&periodoInforme=Mensual> you will find statistics related to Spanish air traffic. Follow the link and you will see the “years” on top of the page. Under each year there are 12 sheets for every month of the year and in each sheet you can find the number of passengers (*pasajeros*) flew, number of operations (*operaciones*) done and number of products (*mercancia*) transported at every airport in Spain. Find the number of **passengers (*pasajeros*)** arriving to Barcelona El-Prat airport **each month over years 2015-2020**. Plot this data and describe it as a function of time and use Excel curve fitting.



2) Using the data you have obtained (number of passengers vs time data) at previous step; calculate the mean, standard deviation, mode, median and variance of number of passengers.

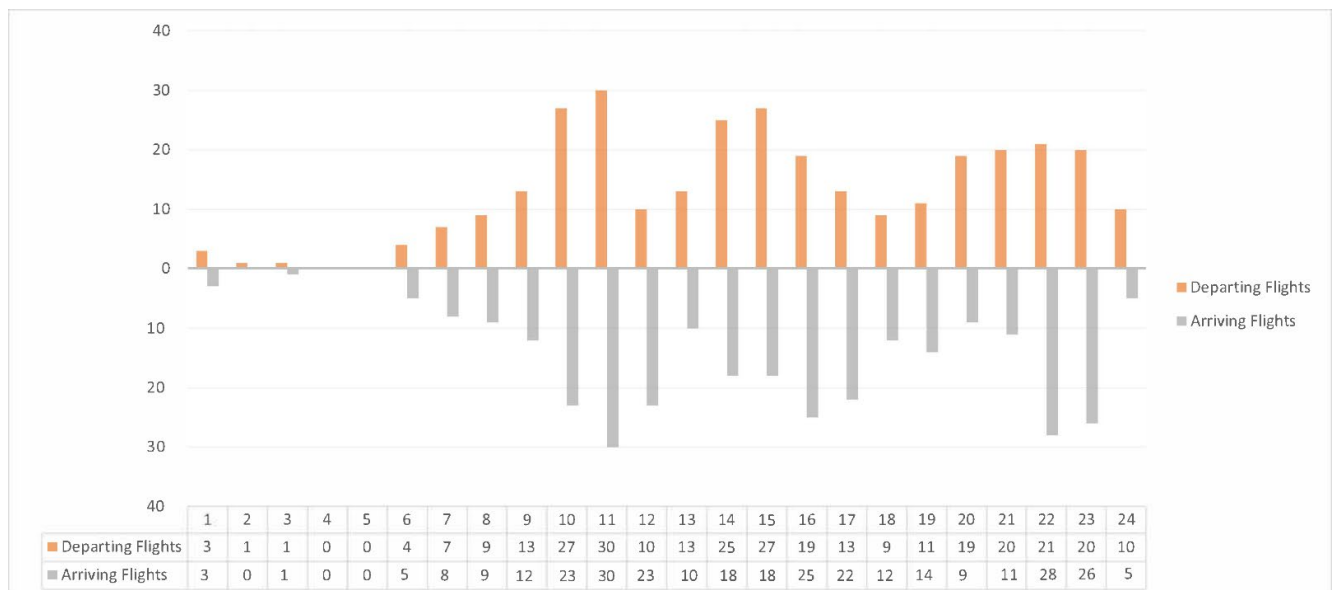
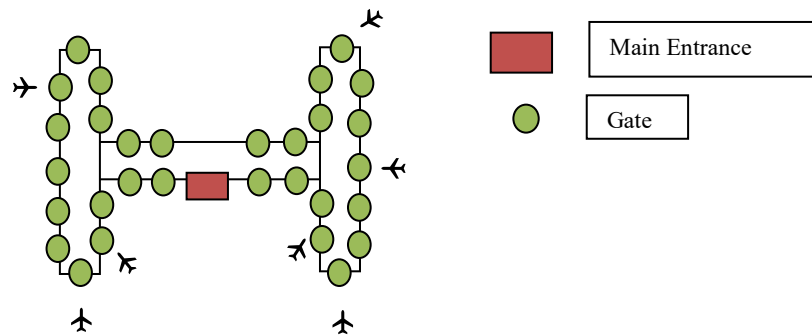


Figure1: Number of planes arriving to and departing from Barcelona El Prat airport on an average day at every hour.

3) At Figure 1, you can see the number of planes arriving to and departing from Barcelona El Prat airport on an average day at every hour (from 1am to 24pm). Assuming only passengers are at the airport and assuming every plane has an identical capacity of 300 people and all of them are operating with full capacity; calculate and plot the number of passengers at the airport on an average day at every hour using Excel as a line graph.

- 4) Using your calculation and plot obtained at step 3, calculate the total and average number of passengers at the airport on an average day.
- 5) Using the data you have obtained at step 3; calculate and plot the hourly percent rate of change in number of passengers in an average day, using Excel.
- 6) Now, assume you need to design a terminal building for this airport. What is the total m^2 area you need to use to ensure that at any hour of the day you will have maximum 1 person at every m^2 in the terminal building?
- 7) Decide what is the optimal geometrical shape to layout the total area you have calculated at step 6 to ensure that passenger walk is minimized from main entrance and to the gates (all passengers are entering to the terminal through main entrance). Where would you locate the main entrance and 30 gates? **DO NOT CHOOSE A CONVEX GEOMETRY! Show dimensions of the layout geometry.** (See the example of a layout below with main entrance and gates located on it).



- 8) Using Surfer (or any other drawing tool you like), plot 2D and if you can, 3D models of your terminal building that you have designed at step 7. What is the mathematical function that describe your terminal geometry?

IMPORTANT POINTS



For this project you will work in groups, in your group you will have group mates from different sections. You can find your group and group mates and the contact details at KHAS LEARN.

This semester project will give you 25% of your overall grade, this is your final work and it actually has no right answer. What makes a difference is how much detail you considered in your design, how much effort you put into it and how professionally you were able to work in group and present your design.

At the final week you will be presenting your work before a jury. After the jury listens to all the groups; each student will vote for the project that they liked the most (no one can vote for their group project). Results of this peer evaluation will have a small effect on the overall grade.

You will have maximum 10 minutes to present your work and every person in the group should speak equally during the presentation. Please be aware of the whole project (not only your part). You are supposed to summarize your project work in a maximum 3-page Word document as a project report (Arial, 1.5pt spacing, font 12).

The date you are supposed to upload your presentation and report to Khas Learn will soon be announced at Khas Learn.

THE BEST PROJECT WILL RECEIVE A SMALL AWARD.

PROJECT GRADING:

PROJECT PRESENTATION: %15

PROJECT REPORT: %7

PEER EVALUATION: %3