

## Assignment 1: Air Transportation

Date Due: September 2, 2012

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### Problem 1

Familiarize yourself with the Great Circle Mapper application (<http://www.gcmap.com/>). Plan two trips from SFO International airports as follows: 1) SFO to LAX and 2) SFO to BOS.

- Extract the great circle distance for these flights.
- Now use the Flightaware web application (<http://flightaware.com/>) and extract flight information for flights flown between those cities. Select two random flights for each Origin and Destination airport pair.
- Compare the actual distances filed in the pilot's flight plan (these are typically stated as "Planned" in Flightaware.com) versus the great circle distances. Comment on the detour factor observed for each of the flights. The detour factor is the ratio of the distance flown and the great circle distance calculated by the mapper <http://www.gcmap.com/>.
- Extract the cruise flight levels for the flights selected in part(b) and comment on the altitudes flown. Is there a trend?
- Extract the complete speed and altitude profiles for three of the flights (one for each city pair) and compare the speeds flown for the three distinct stage length segments. Do you see a trend?

### Problem 2

You are conducting an airline passenger an airline company.

- Use the Aviation Database T-100 Domestic Market (all carriers - see figure below) to extract the number of passengers enplaned at San Francisco (SFO) and at Los Angeles (LAX) airports in the past 3 years. Make a plot and comment on the results observed. The T-100 database is available at the BTS web site ([www.transtats.bts.gov](http://www.transtats.bts.gov)).
- Use the same database to extract the top three airports in the nation with the highest originating at the airport in the year 2012 (or 2011 if 2012 is not available).

Problem

The screenshot shows the RITA Bureau of Transportation Statistics website. The main navigation bar includes links for About RITA, Press Room, Offices, Jobs, Photos & Video, and Contact Us. Below this is a search bar and a menu with options: About BTS, BTS Press Room, Data and Statistics, Publications, Subject Areas, and External Links. The main content area displays the TranStats interface for the 'Air Carriers : T-100 Domestic Market (All Carriers)'. The summary is 'Sum : On-Flight Market Passengers Enplaned by Origin for 2010'. The interface includes a search bar, a 'Go' button, and a 'Cancel Search' button. Below the search bar is a 'Snapz Pro X' watermark. The data table has columns for Filter Categories, Filter Variables, Filter Statistics, and Filter Years. The current filters are Origin, Passengers, Sum, and 2010. There is a 'Recalculate' button at the bottom right of the table.

### Problem 3

You are conducting a study of flight demand for various airports in the country.

- a) Use the Aviation Database T-100 Domestic Segment (all carriers - see figure below) to extract the number of departures performed and seats offered from San Francisco International Airport (SFO) in the past 3 years. Make a plot (or a bar chart) and comment on the results observed.

The screenshot shows the RITA website interface. At the top, there is a navigation bar with the RITA logo and the text 'Research and Innovative Technology Administration Bureau of Transportation Statistics'. Below this is a green navigation menu with options: 'About BTS', 'BTS Press Room', 'Data and Statistics', 'Publications', 'Subject Areas', and 'External Links'. The main content area is titled 'Air Carriers : T-100 Domestic Segment (All Carriers)'. It features a search box on the left with the text 'Search the Results:' and a 'Go' button. The main content area displays a table with the following structure:

Filter Categories	Filter Variables	Filter Statistics	Filter Years
Origin	DepPerformed	Sum	2010

Below the table, there is a 'Recalculate' button and a note: 'Latest available 2011 data is February'.

### Problem 4

You are conducting a study of domestic passenger statistics.

- a) Use the RITA (BTS) database to extract the U.S. domestic passenger enplanements from 2000 to 2012. Make a plot and comment on the results observed.
- b) Estimate the average domestic fares from three airports in the DC area: DCA, BWI and IAD. Compare the fares at these airports with average nationwide fares. Offer some plausible explanation about the trends observed.
- c) Estimate the market share of flights by US Airways for the following two airports: a) CLT and b) DCA. Plot the market share over the past 5 years and comment on the trends observed.

### Problem 5 - Questions from Whitford's Book (Chapter 1) - Short answers

- a) Explain the reasons behind the rapid increase in available seat-miles after the year 1940.
- b) Explain the reasons behind the success of the Douglas DC-3 as the first commercially viable airliner.
- c) Explain the shape of the production cycles of the Boeing 747 aircraft between 1970 and the end of the 1980s.
- d) Why did the British aircraft become less relevant than their American counterparts?