CEE 5614/CEE4984: Analysis of Air Transportation Systems Fall 2020

Assignment 2: Basic Performance Observations and Calculations

Date Due: September 11, 2020 Instructor: Trani

Problem 1

Use the Eurocontrol interactive BADA database (https://contentzone.eurocontrol.int/aircraftperformance/default.aspx?) and Flightaware to answer the following questions:

a) American Airlines flight 106 is a long-range flight between JFK and London Heathrow airport (LHR). Find the typical cruise altitude and Mach number for the Boeing 777-300ER aircraft according to the BADA database.

b) Use Flightaware to check the flight on September 3, 2020 and verify the typical altitudes flown between JFK and LHR. Compare the observed altitudes to those reported in BADA database. Comment.

c) Use the graphical profile of the BADA database for the B777-300ER to estimate the typical time to climb to the initial cruise altitudes reported by Flightware. Compare the rates of climb of BADA and the actual flight.

d) American Airlines flight 101 is a long-range flight between LHR and JFK. For September 3, 2020, compare the flight times of both flights. Explain the differences observed.

Problem 2

The Airbus A320 is a popular aircraft operating at DCA airport. Use the FAA Aircraft Database posted on the syllabus page to estimate the saturation capacity of runway 19 at DCA airport assuming all arrivals fly similar speeds as the A320. DCA ATC controllers use 3 nm as the minimum separation between successive arrivals. At sea level conditions, Virginia Tech research shows that ATC technical buffers for A320 class aircraft are 16.5 seconds.

Problem 3

Use the Matlab computer program ISAM.m (available in the Matlab files section of our web site - http://128.173.204.63/courses/cee5614/matlab_files_cee5614.html) to answer the following questions:

a) An Airbus A330-300 cruises over the North Atlantic at Mach 0.81 and at Flight Level 390. Assuming ISA atmospheric conditions, find the true airspeed (in knots) of the aircraft and the typical outside atmospheric temperature at the cruise altitude.

b) A Cessna Citation X performs a continuous descent from FL400 at a constant indicated airspeed of 260 knots. Estimate the value of true airspeed under ISA conditions from FL400 to FL100 every 5,000 feet.