

## Assignment 5: Flight Planning, ETOPS, and BADA Calculations

Due: March 5, 2026

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### Problem 1

Use Flightaware data to compare Air India flight 102 (AIC102) and American Airlines flight 292 between New York (JFK) and Delhi (DEL) on February 15, 2026. Extract two flight plans filed by both airlines and answer the following:

- a) State the aircraft used to fly the route by each airline.
- b) Use Skyvector to plot the routes filed in the flight plans for both days. The flight plan waypoints are included in the Flight Data panel. Make a screen capture of the routes flown. You can show the routes individually.
- c) Use the Skyvector route and distance information to estimate the difference in distance flown for the two flights. Provide some possible reasons for the observed changes in the routes flown.
- d) Estimate the number of climbs performed during each flight and the approximate time between climbs.
- e) Use the NOAA Re-analysis historical data to show the winds aloft at the altitude flown by the flights. The Re-analysis historical data can be found at:

<https://psl.noaa.gov/data/composites/hour/>

Note: The 250 mb pressure level is equivalent to an altitude of 34,000 feet.

## Problem 2

Refer to pages 160-186 in the Aircraft Performance Notes 2 (section describing the BADA Model) to answer the questions. Specifically, use the BADA model for the Boeing 787-8F to do your analysis.

- a) Find the fuel burn (in kilograms per minute) for the Boeing 747-8F according to the BADA model while the aircraft cruises at FL 370 and 470 knots. Assume the aircraft has a nominal mass of 366,330 kilograms. Use the BADA model **clean** drag polar to estimate the fuel burn. Show all your calculations.
- b) Compare your answer against the value reported in the table on page 163 for the Boeing 787-8F at FL370. Explain any differences.
- c) Find the lift to drag ratio at the cruise condition in part (a).

## Problem 3

Use the new generation long-range transport aircraft provided in class ([http://128.173.204.63/cee5614/cee5614\\_pub/B787\\_class.m](http://128.173.204.63/cee5614/cee5614_pub/B787_class.m)) to answer the questions. The aircraft flies a route between Miami (MIA) and Madrid (MAD). The flight plan filed is as follows:

FOLZZ3 SUMRS M327 JIMAC BALOO 3500N/06000W 3800N/05000W 3930N/04000W 4100N/03000W 4200N/02000W BANAL ADORO L155 ZMR

At waypoint 3800N/05000W the aircraft has an engine failure. When the engine failure occurs, the aircraft is flying at FL 350 and Mach 0.82. At 3800N/05000W, the aircraft has a mass of 200,000 kilograms and 53,000 kilograms of fuel left. The aircraft is certified for ETOPS 180 minutes.

- a) Use Skyvector to estimate the shortest path distance from the point of engine failure to Lajes Airport (LPLA).
- b) Estimate the best true airspeed and Mach number to reach the destination at the best single-engine speed. Explain your speed and single-engine selection procedure. Avoid speeds that are on the back side of the drag curve. Assume zero winds along the route.
- c) Find the fuel used to the destination airport from the point of engine failure.
- d) Given the ETOPS criteria for the aircraft, can the route be flown legally? Explain.