

CEE 5614: Analysis of Air Transportation Systems
Quiz 1 : Open Notes

Fall 2020

Date Due: October 9, 2020 at 12:00 Midnight via Canvas

Instructor: Trani

Instructions

Write your solutions in the space provided. Add any additional pages with calculations as needed. Make sure each additional page has your name.

Honor Code Pledge

The information provided in this exam is my own work. I have not received information from another person while doing this exam.

(your signature/name)

Problem 1

Use the very light jet aircraft file provided in class (http://128.173.204.63/courses/cee5614/cee5614_pub/eclipse500New_class.m) to answer the following questions. Assume ISA atmospheric conditions in your calculations.

- a) Based on the data provided, estimate the Top of Climb Point (TOC) altitude if the air taxi pilot wants to cruise at an initial altitude that provides a minimum climb rate of 500 ft/minute. The aircraft departs an airport located 2,320 feet above mean sea level conditions and the departure mass is 2,700 kilograms. State the selected TOC altitude.
- b) During the climb, Air Traffic control holds the very light jet at FL 170 for 2 minutes due to traffic. Estimate the fuel burn during the two-minute hold if the pilot selects 230 knots Indicated Airspeed.
- c) Estimate the fuel used to reach the TOC altitude selected in part (a).
- d) Find the Indicated Airspeed for an optimal (i.e., highest) rate of climb as the aircraft climbs through 5,000 meters. State your method and show sample calculations to find such speed.

Problem 2

A cargo airline is considering non-stop operations from Salt Lake City (Utah) to Chengdu (China) using Boeing 747-8F aircraft. The aircraft has a MTOW of 987,000 lb. The engine used is the GEnx 2B engine.

- a) Is the airline able to operate the route at MTOW? State your calculations to support your answer. Show temperature used and indicate the figures in the Boeing document used.
- b) if the answer in part (a) is no, then estimate the maximum weight departing Salt Lake.
- c) Find the runway length departing Salt Lake on a very hot summer day (ISA + 25 deg. C.). What is the flap setting used?
- d) Compare the Payload/Range diagrams for the Boeing 787-8F and the 787-8 (passenger version). Describe some of the differences in performance between the two aircraft. State a possible explanation for the difference in performance (if any).