## CEE 4674: Airport Planning and Design Fall 2025

Quiz 1: Open Notes and Take Home

Date Due: October 13, 2025 Instructor: Trani

**Instructions**

Write your solutions in the spaces provided. Add any additional pages with calculations as needed. Ensure that each additional page bears your name.

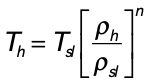
**Honor Code Pledge**

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

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## Problem 1 (35 Points)

A new airline would like to operate **Boeing 737-8 Max** between Colorado Springs (COS) and Punta Cana (PUJ), Dominican Republic. The Boeing 737-8 Max (see Figure 1) operated by the airline has 178 seats in a two-class seating configuration. The airline uses the **CFM Leap 1B28B1 engine,** and the Maximum Takeoff Weight is rated at 182,700 lbs. The operating weight of the aircraft is 99,000 lbs.

1. Find the runway length needed to operate at **both airports** to satisfy FAA/EASA runway length requirements. Use the airport design temperatures at both locations. You can find worldwide weather and temperature data at: <https://weatherspark.com/>. Clearly state all your assumptions and show your intermediate calculations, including those for payload and takeoff weight. In your analysis, consider future climate change temperature effects if available (i.e., higher emissions). For Punta Cana, assume climate change will raise the temperature by the same amount as in Colorado Springs. Also, consider the effects of runway grade on your analysis.
2. Estimate the amount of fuel used for the flight between COS and PUJ.
3. Can the Boeing 737-8 Max operate on the route COS-PUJ with 100% of the seats full at the airport design temperature? Explain.
4. Do you consider the Boeing 737-8 Max a suitable aircraft for flying this route? Comment on any payload or runway length limitations or weight restrictions for the aircraft.
5. Explain the observed differences in performance at COS and PUJ using the fundamental equation of motion explained in class.

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| Figure 1. Boeing 737-8 Max Landing at Punta Cana International Airport (PUJ). Source: A. Trani. |

Problem 2 (35 Points)

Use the Small Aircraft Runway Length Analysis Tool (SARLAT) to evaluate the existing runway conditions at Southern West Virginia Regional Airport (EBD) in West Virginia. The airport serves single-engine, multi-engine piston, turboprop, and jet-powered aircraft (see Table 1). Table 1 was generated as part of a new master plan for the airport.

Table 1. Aircraft Fleet Mix for Problem 2.

| **Aircraft Type** | **Aircraft** | **Annual Operations** |
| --- | --- | --- |
| Piston | Cirrus SR20 | 1200 |
| Piston | Cessna 421 | 450 |
| Turboprop | Beechcraft King Air C90 | 400 |
| Turboprop | Cessna 208 Caravan | 560 |
| Jet | Cessna 560 XL | 350 |
| Jet | Embraer Phenom 100 | 550 |
| Total |  | 3510 |

1. Is the existing runway length available suitable for corporate jet and turboprop operations at 80% useful load when the runway pavement is dry? Explain.
2. Name the most critical aircraft operating at the airport.
3. If the future aircraft operations do not meet the requirement in part (a), propose an improvement that the FAA will pay for. Explain.
4. State the dimensions of the RSA and ROFA needs at the airport. The runway is a non-precision runway with approach visibility minima of 1.25 miles for AAC A and B class aircraft. Clearly state the RDC Code of the airport, considering the population in Table 1.

**Problem 3 (30 points)**

**Short answer or true/false. Show your calculations.**

|  | **Question** | **Short Answer** |
| --- | --- | --- |
| 1 | The Airbus A330-900 AAC group. |  |
| 2 | The Gulfstream 650 taxiway design group. |  |
| 3 | Runway 19 at Reagan National Airport (DCA) is a precision runway with approach lights. (True/False) |  |
| 4 | Change in the length of the RSA dimension when the airport transitions from A-II to C-II. Assume visibility is not lower than 3/4 miles. |  |
| 5 | Height of the inner transitional OFZ surface at a point 630 feet from the runway centerline. The critical aircraft is the Boeing 747-8, and the airport elevation is 2,160 feet above mean sea level. The airport has instrument flight procedures (IFP) with lower than ½ mile (0.8 km) visibility, |  |
| 6 | Charleston, WV airport has an EMAS capable of stopping a Gulfstream GIII traveling at 70 knots and overrunning the runway after landing on runway 23. (True/False) |  |
| 7 | Approach speeds used to designate AAC groups are measured at the maximum allowable landing weight. (True/False) |  |
| 8 | Aircraft design group for the Cessna Caravan. |  |
| 9 | Height of the approach OFZ for a precision runway at a location 1,100 feet from the runway threshold. The approach lights are 1,400 feet in length. |  |
| 10 | Average grade of runway 28 at Falwell Airport (W24) in Virginia. |  |