

Quiz 1 - Take Home (Due October 13, 2023 via Canvas)

Open Notes and Internet

Instructor: A.A. Trani

Instructions

Create a solution file using the word processor of your choice. Convert to PDF and submit to Canvas. **Include all screen captures of all your work including aircraft manufacturer's tables and figures, FAA nomographs and others if you want to receive partial credit.**

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 (35 points)

Perform an assessment of the runway length at White Plains Westchester County Airport (HPN). A new airline would like to operate from HPN using the Boeing 737-8 (Boeing 737-8 Max) with characteristics shown in Table 1. For this analysis, use the latest version of the Boeing documents for airport design.

Table 1. Aircraft Considered in the Runway Length Analysis of HPN. Picture Source: A.A. Trani.

Aircraft	Engine	Remarks
----------	--------	---------

Boeing 737-9 (Max) with CFM LEAP-1B engines. Aircraft maximum design takeoff weight is 189,900 lbs. and 193 seats in a two-class layout.



- Estimate the operating empty weight of the aircraft using the payload-range diagram.
- Can the Boeing 737-9 Max operate from HPN in routes to Denver (DEN) and Santo Domingo, Dominican Republic (SDQ) with 100% of the seats full at the airport design temperature? Show me all the steps in the analysis to estimate runway length for the critical route. Clearly state all your assumptions and show your intermediate calculations. In your analysis consider future climate change temperature effects (i.e., higher emissions). Also, consider the runway grade in your analysis.
- Use Google Maps or Google Earth to examine the runway ends for the longest runway at HPN. Tell me if the airport complies with the RSA and ROFA dimensions required. Assume the critical aircraft is the Boeing 737-9Max.
- Estimate the runway length needed if the airline wants to fly the critical route with 100% passengers plus an additional 10,000 lbs. of cargo. Estimate if a runway extension is needed. If a runway extension is needed, would the runway extension fit in the existing airport property?

Problem 2 (35 Points)

Use the Small Aircraft Runway Length Analysis Tool (SARLAT) to evaluate the runway and Grant Co. Airport (SVC) in New Mexico. The airport serves single, multi-engine piston, turboprop and jet powered aircraft (see Table 2).

Table 2. Aircraft Fleet Mix for Problem 2.

Aircraft Type	Aircraft	Percent of Fleet Mix (%)
Piston	Cirrus SR20	20
Piston	Cessna 340	14
Piston	Beechcraft Baron 58	13
Turboprop	Beechcraft King Air B200GT	10
Turboprop	Beechcraft King Air B350ER (Advanced Air)	5
Turboprop	Cessna 208 Caravan	12
Jet	Cessna 560 XL	6
Jet	Cessna Citation 3	8
Jet	Embraer Phenom 300	12
Total		100

- Is the existing runway length available suitable for corporate jet and turboprop operations at 80% useful load when the runway pavement is wet? Explain.
- Name the most critical aircraft operating at the airport.
- The Beechcraft King Air B350ER operated by Advanced Air flies daily to Albuquerque, New Mexico. The aircraft has 10 seats. Determine if the flights can be operated with all seats full.
- If the operations are not possible with the existing runway, propose an improvement that the FAA will pay for.

Problem 3 (30 points)

Short answer.

	Question	Short Answer
1	Cuyahoga County airport has a EMAS able to stop a Gulfstream GIII traveling at 70 knots and overrunning the runway after landing on runway 6.	
2	The Bombardier Global Express 7000 taxiway design group.	
3	The Douglas DC-7B was a successful twin engine, piston-powered aircraft.	
4	Runway 36C at Charlotte Airport (CLT) is a precision runway with approach lights.	
5	Increase in RSA longitudinal dimensions when the airport transitions from B-II to C-II.	
6	Maximum height of a object located 450 feet from the runway centerline. The critical aircraft is the Boeing 767-400 and the airport elevation is 1,250 feet. Only check the OFZ.	
7	The AAC group for the Boeing 747-8.	
8	Approach speeds used to designate AAC groups are measured at the minimum landing weight.	
9	Aircraft design group for the Airbus A350-1000.	
10	Number of commercial passengers that boarded flights at ROA in 2022.	
11	Largest airline carrying passengers at Reagan National Airport.	