AOE 2104 Introduction to Aerospace Engineering Problem Sheet 2

Due 18 September, 2003

Read Sections 1-4 from Web Site

6. An aircraft is at a pressure altitude of 7000 ft. The temperature is 95 deg F. Determine the density altitude at these conditions. (In ft)

7. What is the aspect ratio of
   a) a wing with a square planform
   b) a 747 that has a wing area of 5,500 sq ft and a wing span of 195.68 ft
   c) An F14 Tomcat with wing area of 565 sq ft, and a span of 61 ft 10 in
   d) calculate the mean geometric chord of the 747 (for comparison, the mean aerodynamic chord is 27.31 ft)

8. A wind tunnel operates at 0.2 m of water
   a) What is the airspeed in the wind tunnel assuming standard sea level conditions (m/s)
   b) What would be the airspeed under these same conditions, but the wind tunnel was located in the mountains at standard atmospheric conditions at 2000 m?

9. The Virginia Tech Stability Wind Tunnel can operate up to 200 miles an hour. Assume standard atmospheric conditions at 2000 ft altitude (Blacksburg's altitude). The vehicle being tested has a maximum lift coefficient of $C_{L_{max}} = 1.7$. The model has a wing area of 2 sq ft. What is the maximum load that we can expect to measure?

10. Wind tunnel tests yield the following data:

α	-2 deg	0	2	4	6
C_L	0.0	0.2	0.4	0.6	0.8

Determine the lift curve slope of this vehicle, $a = \frac{dC_L}{d\alpha} = ?$