AOE 3104 Vehicle Performance Problem Sheet 7

Due 28 March, 2003

Read Marchman, Chapters 4, 5

36. An aircraft weighs 56,000 lbs and has a 900 ft^2 wing area. Its drag polar is given by: $C_D = 0.016 + 0.04\ C_L^2$.

a) Find the minimum thrust required for straight and level flight and the corresponding airspeeds at sea-level and at 30,000 ft

b) Find the minimum power required and the corresponding true airspeeds for straight and level flight at sea-level and at 30,000 ft.

37. An aircraft has the following specifications: W = 24,000 lbs, S = 600 ft^2, $C_{D_{0L}} = 0.015$, and K = 0.056

This aircraft has run out of fuel at an altitude of 30,000 ft.

a) Find the initial and final values of its airspeed for best range glide

b) Find the glide angle for best range

c) Find the rate of descent at 30,000, 15,000 ft, and sea-level

d) Estimate (find) the time to descend to sea-level

38. The above aircraft (prob 37) has a sea-level thrust of 6000 lbs, that is independent of airspeed. Also, the thrust varies proportional with air density. Estimate the ceiling for this aircraft.

39. Find the maximum angle of climb at sea-level and at 30,000 ft.

40. Find the maximum rate of climb at sea-level and at 30,000 ft.