

AAE 4660 Aeropropulsion Systems
HW # 1
Fall 2009
Due: Wednesday, September 23, 2009

1. Derive

$$TSFC = \frac{V_0}{\eta_p \eta_T h_{PR}}$$

Hint: Use the relations for η_0 .

2. Consider an advanced fighter engine operating at Mach 0.8. The performance data are given in the following,

$$F = 50 \text{ kN}$$

$$\dot{m}_f = 2.65 \text{ kg/sec}$$

$$h_{PR} = 42,800 \text{ kJ/kg}$$

Determine the specific thrust, thrust specific fuel consumption, exit velocity, thermal efficiency, propulsive efficiency, and overall efficiency for altitudes of 10km, 8km, and 12km. Assume $p_0 = p_e$ and that at the altitude of 10km, $\dot{m}_0 = 45 \text{ kg/sec}$. Briefly discuss your results.