page 1 of 4

MIE 200F – Dynamics
Midterm Test
November 4, 2002
Test duration: 100 minutes

Question 1: (15 marks)

A satellite of mass 1500 kg is being driven by its own rockets in a spirally climbing pattern from the planet Krypton, as shown in the diagram. Krypton is a spherical planet of radius R = 7000 km; the acceleration due to gravity at its surface is $g = 11.5\ m/s^2$. At the instant shown, the satellite has an altitude of 0.8R above the planet's surface, and its altitude is increasing at a constant rate of 230 m/s. Its total speed is 1400 m/s, and is increasing by $10\ m/s^2$.

(5) (a) Find v_θ and v_r at the position shown

(5) (b) Find $\dot{\theta}$, $\dot{r}$, and a_r at the position shown.

(5) (c) Suppose that the rockets are switched off at the position shown. What will be the values of a_r and