

**Extra Credit**

**10. It's known that the launch vehicle for the spacecraft released the satellite at an altitude of 700 km with a velocity of 7.8 km/sec. 12 minutes after separation spacecraft telemetry indicated that the main engine on the spacecraft fired, imparting an instantaneous 750 meter/sec velocity change tangent to the orbit. 30 minutes later the main engine fired again, imparting an instantaneous 500 meter/sec velocity change tangent to the orbit. What are the final orbit properties? All thrusting is done tangent to the orbit.**

- Final semimajor axis: 12082.486372 km
- Final eccentricity: 0.339653
- Final perigee altitude: 1600.638305 km
- Final apogee altitude: 9808.334440 km
- Final period: 13217.389617 s