

## AOE 4134 Homework 6

There is no Homework 6, since we had an exam this week.

However, you may want to work on the two problems involving orbit determination using range, azimuth and elevation (Problems 9 & 10 that were most recently omitted from Homework 5).

**These two problems WILL be in Homework 7, and they will likely have company.**

1. Do Problem 2.17 in BMW.
2. An object is observed by a radar station in Goose Bay, Labrador (you'll need to consult a map to find the coordinates of this site). The radar measures the following variables at epoch  $t_o$  (0300 UTC Sep 11, 2000):

$$\begin{array}{ll} \rho = 200 \text{ km} & \dot{\rho} = 0.1 \text{ km/s} \\ Az = 45^\circ & \dot{Az} = 2^\circ/\text{s} \\ El = 60^\circ & \dot{el} = 2^\circ/\text{s} \end{array}$$

- a) Determine  $\vec{r}$  and  $\vec{v}$  at epoch (km, km/s, in ECI frame).
- b) Determine the orbital elements  $a$ ,  $e$ ,  $i$ ,  $\Omega$ ,  $\omega$ , and  $\nu_0$ .
- c) Is it possible that this object is a ballistic missile? You must explain your reasoning in answering this question. A simple “yes” or “no” gets zero credit.