

## Problems Week 5

1. A spaceship travels unaccelerated from event A to event B and another one from B to C. Show that a third could go directly from A to C.
2. An observer U measures the events  $P_1$  and  $P_2$  to be simultaneous and a distance  $l$  apart. Another observer V is traveling from  $P_1$  towards the spatial point where  $P_2$  occurs, with relative velocity  $v$  according to U. What is the spatial distance between  $P_1$  and  $P_2$  according to V?
3. The timelike unit vectors  $\hat{u}, \hat{v}$  and unit vectors  $\hat{a}, \hat{b}$  with  $\hat{u} \cdot \hat{a} = \hat{v} \cdot \hat{b} = 0$  all lie in the same 2-plane.  $\hat{u} \cdot \hat{v} < 0$ . Calculate  $\hat{a} \cdot \hat{b}$ .