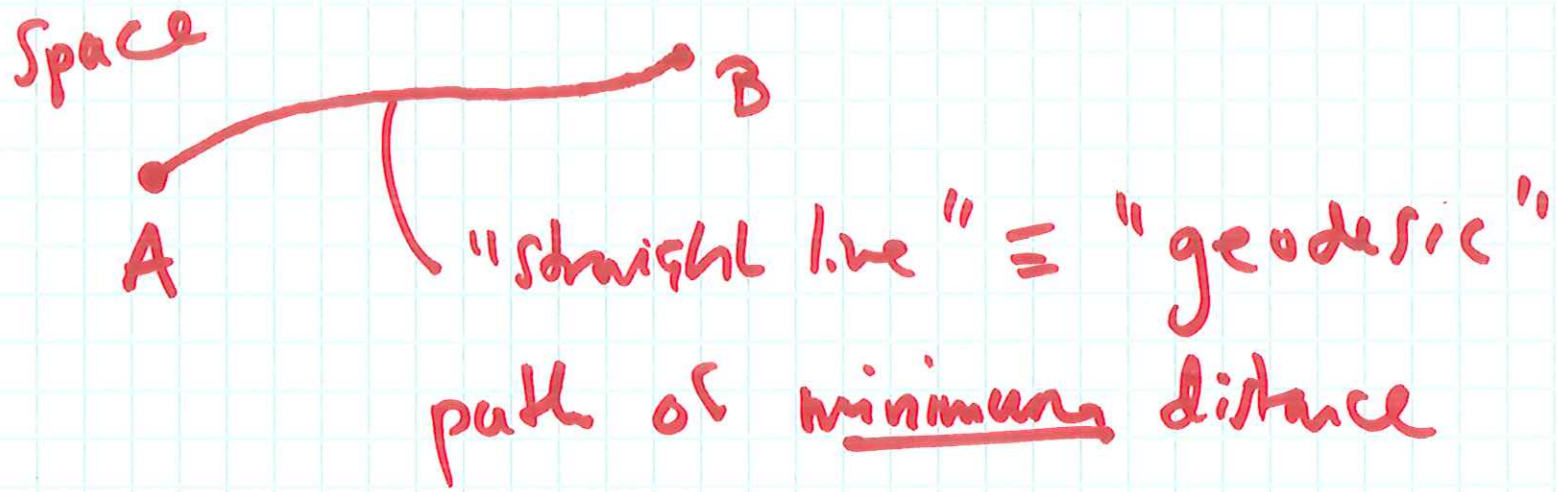
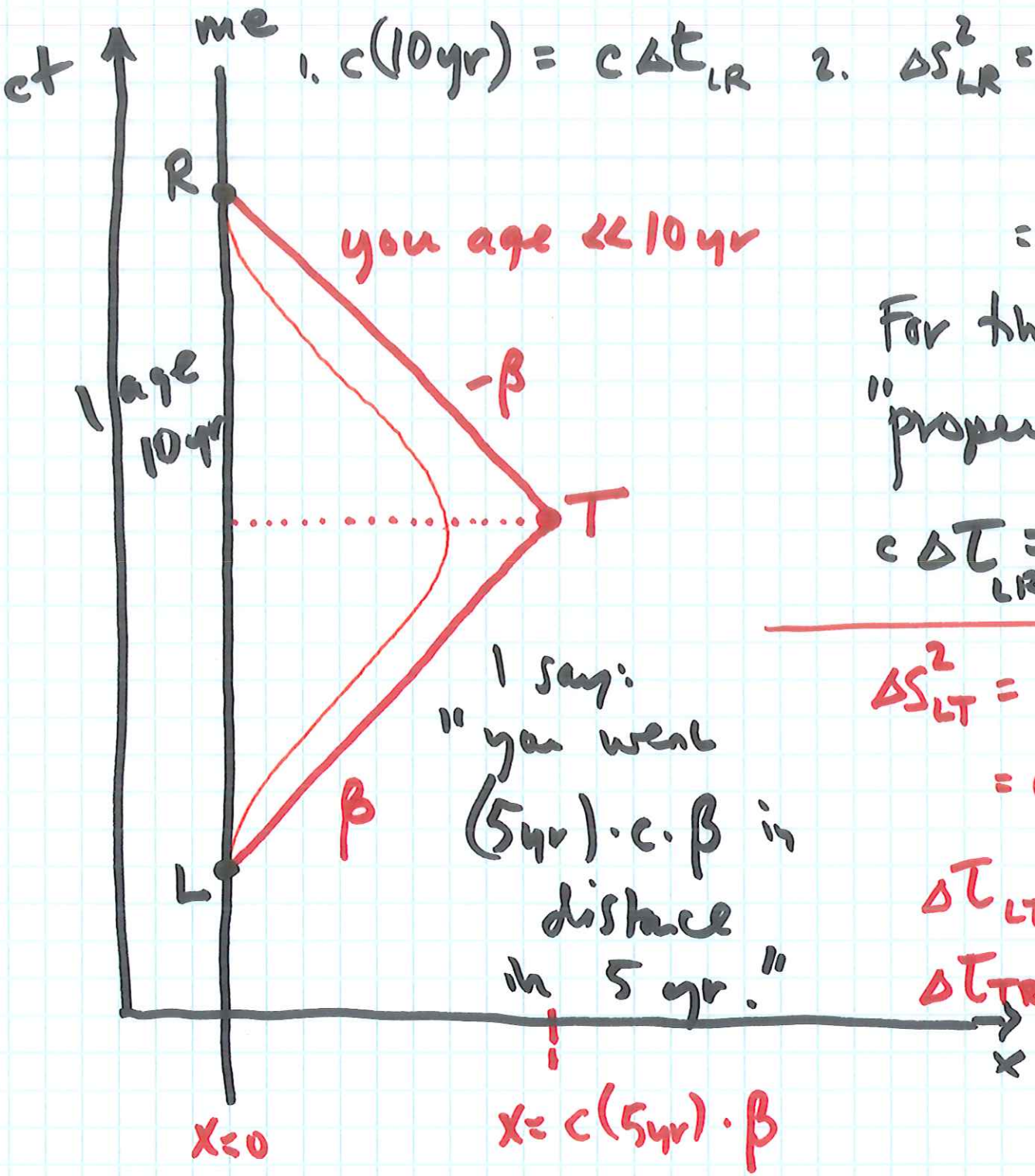
NYU Physics I — 2016-12-06

Agenda — - reading: Chs 4,5,6 of Sr.

- PS 13, 1(d)
- scope of exam 6 — PS 11, 12, (13) orbital pars — today. orbits + internals
- twins.





1. $c(10\,\text{yr}) = c\,\Delta t_{LR}$

2. $\Delta s^2_{LR} = \underbrace{c^2\Delta t^2}_{\text{time}} - \underbrace{\Delta x^2 - \Delta y^2 - \Delta z^2}_{\text{spatial}}$

$= c^2(10\,\text{yr})^2$

For timelike intervals "proper time" $\Delta\tau$

$$c\,\Delta\tau_{LR} = \sqrt{\Delta s^2_{LR}}\,.$$

$$\Delta s^2_{LT} = c^2(5\,\text{yr})^2 - c^2(5\,\text{yr})^2\cdot\beta^2$$

$$= c^2(5\,\text{yr})^2\left[1-\beta^2\right]$$

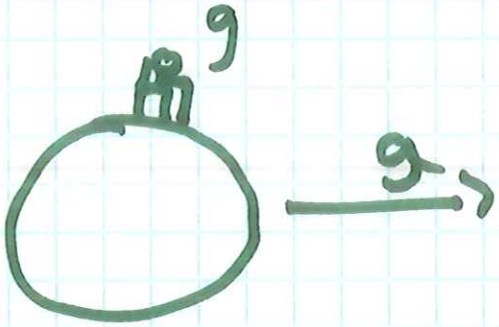
$$\Delta\tau_{LT} = 5\,\text{yr}\sqrt{1-\beta^2} \ll 5\,\text{yr}$$

$$\Delta\tau_{TR} = 5\,\text{yr}\sqrt{1-\beta^2} \ll 5\,\text{yr}$$

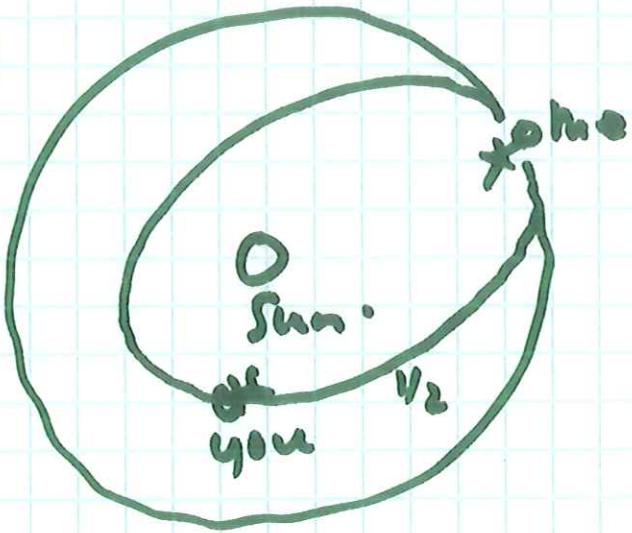
In space-time: The geodesic is the path that (locally) maximizes the proper time $\sqrt{\Delta s^2}$

trajectories are always extrema of time.

①



②



③