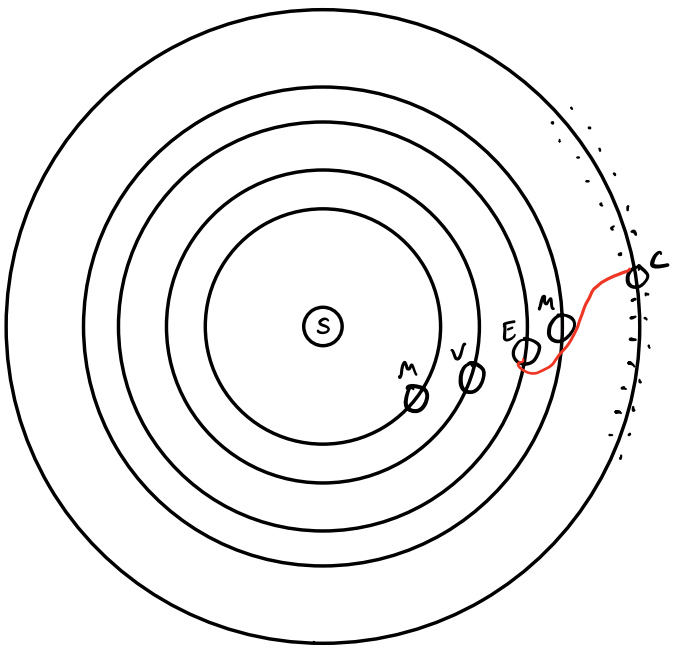
TO CERES



Earth parking orbit → Ceres orbit → Ceres capture + park + crash

↓

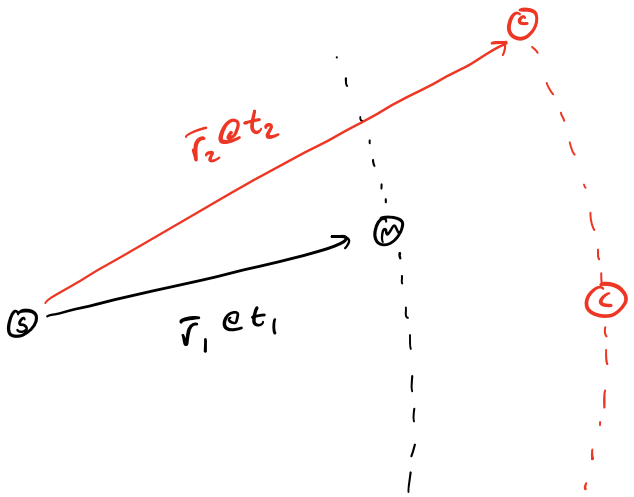
plane change + lambert + Mars g-assist

Earth orbit → plane change lambert → Mars → g-assist + plane change ± lambert? → Ceres → circularize + crash

Lambert Mars → Ceres

Needed for Lambert

$\bar{r}_1$, $\bar{r}_2$, $(\Delta\theta)$, $\Delta t = t_2 - t_1$



steps to compute

$$\Delta\theta = \cos^{-1}\left(\frac{\bar{r}_1 \cdot \bar{r}_2}{r_1 r_2}\right)$$

find β_{min}, Δt_m

$$c = \|\bar{r}_2 - \bar{r}_1\|$$

$$s = \frac{r_1 + r_2 + c}{2}$$

$$\sin\left(\frac{\alpha}{2}\right) = \sqrt{\frac{s}{2a}}, \quad \sin\left(\frac{\beta}{2}\right) = \frac{s-c}{2a}$$

TOF: $$\Delta t = \frac{a^{3/2}}{\sqrt{\mu}}\left[\alpha - \beta - (\sin\alpha - \sin\beta)\right]$$

solve for a with Matlab bisection

- plot $\Delta\theta$ vs t from jpl horizons → python?
  → maybe calc. params for each $\Delta\theta$

- plot Δt_p & Δt_m vs. a

- elliptic trajectory from flyby assist
- test different θ to find optimal ΔV