MAE3145: Homework 6 Selected Answers

Due date: 2 456 069.417 JD

Problem 1

- Total $\Delta V = 15.707\,\mathrm{km\,s^{-1}}$
- Total time of flight $TOF = 30.63$ years
- Actual Voyager 2 TOF $TOF = 12.02$ years

Problem 2

- Plane change at current altitude $\Delta V = 2.310\,06\,\mathrm{km\,s^{-1}}$
- Plane change using bielliptical transfer $\Delta V = 1.457\,\mathrm{km\,s^{-1}}$

Problem 3

- ΔV is all three reference frames for maneuver at $\nu = 90°$

```
DV : 0.3750000000000001 V -0.649519052838329 C 0.0 N km/sec
DV : -0.46379179721347064 R 0.5894040794204761 T 0.0 H km/sec
DV : -0.5894040794204761 P -0.4637917972134706 Q 0.0 W km/sec
```

- New orbit velocity - $V_2 = 4.217\,90\,\mathrm{km\,s^{-1}}$
- New orbit true anomaly - $\nu = 40.8°$
- ΔV is all three reference frames for maneuver at $\nu = 270°$

```
DV : 0.3750000000000001 V -0.649519052838329 C 0.0 N km/sec
DV : -0.7452940449895329 R 0.08388555598635647 T 0.0 H km/sec
DV : 0.37500000000000067 P 0.6495190528383287 Q 0.0 W km/sec
```

- New orbit velocity - $V_2 = 3.6\,\mathrm{km\,s^{-1}}$
- New orbit true anomaly - $\nu = 259.36°$

Problem 4

- Phasing orbit period 11 131.7 s
- Total $\Delta V = 4.2657\,\mathrm{km\,s^{-1}}$

Problem 5 to 8

- You can compare all of the answers with `comfix_solution.txt` within the MAE3145_Library

Problem 9

- A to C total $\Delta V = 2.078\,\mathrm{km\,s^{-1}}$
- B to D total $\Delta V = 1.605\,\mathrm{km\,s^{-1}}$

Problem 10

- Total $\Delta V = 3.761\,\mathrm{km\,s^{-1}}$ and $\Delta V = 3.785\,\mathrm{km\,s^{-1}}$
- TOF $TOF = 199\,\mathrm{h}$ and $TOF = 22.38\,\mathrm{h}$

Problem 11

- $\Delta V_1 = 3.212\,\mathrm{km\,s^{-1}}$
- $\Delta V_2 = 2.336\,\mathrm{km\,s^{-1}}$

Problem 12

Extra credit