AAE 532 – Orbit Mechanics
Problem Set 10
Due: 2459194.1875 (UT)
LAST Problem for the Semester

Problem 4: Recall Problems 2 and 3. Both problems considered the challenge of an Earth-to-Mars transfer that was reasonably efficient in terms of DV but also arriving as quickly as possible by reducing TOF. Both Problems 2 and 3 employed the same space triangle but used different TOFs.

For the final Problem of the semester, try to further explore the DV vs TOF trade-off. Examine one more transfer and assess whether you can improve on the DV cost for an different TOF.

(a) Focus on one of two options: (a) You can define the same space triangle and use a new TOF; OR (b) try a new space triangle and one of the TOFs in Prob 2 or Prob 3. [You cannot use a Hohmann or bielliptic transfer!]

Justify your space triangle / TOF combination. Why do you think your choices might yield a better result?

(b) Produce results consistent with the results in the earlier problems. Assess and discuss your results:

Did your new combination produce 'improved' results?

Why did the DV improve? What dynamically changed about the transfer that lead to improvements?

OR

Why was there not an improvement? What dynamic conditions during the transfer likely resulted in a less desirable transfer?

(c) What is the next step? What combination would you try next time? Why?

[Note: You only have to try <u>one</u> more transfer and demonstrate the results. *To support an actual mission, many combinations are compared!*]