

# Celestial Mechanics – Exercises

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## Unit 7

### Problem 7.1

Show that the orbital elements given in Table 1 could belong to one and the same comet. (*Hint: What is the perturbing body?*)

(2 points)

Table 1: Orbital elements at two epochs

Epoch	$i$ [°]	$a$ [au]	$e$
1950-04-29	9.6	14.2	0.31
1999-01-22	4.8	6.68	0.36

### Problem 7.2

What does it mean for an object to have a Tisserand parameter greater than, equal to, or less than 3? (*Hint: You can do this theoretically, but it might be helpful to calculate the Tisserand parameter for various small bodies in the Solar System. For this, you will need their orbital elements*<sup>2</sup>.)

(2 points)

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<sup>2</sup>e.g., from [https://ssd.jpl.nasa.gov/sb/elem\\_tables.html](https://ssd.jpl.nasa.gov/sb/elem_tables.html)