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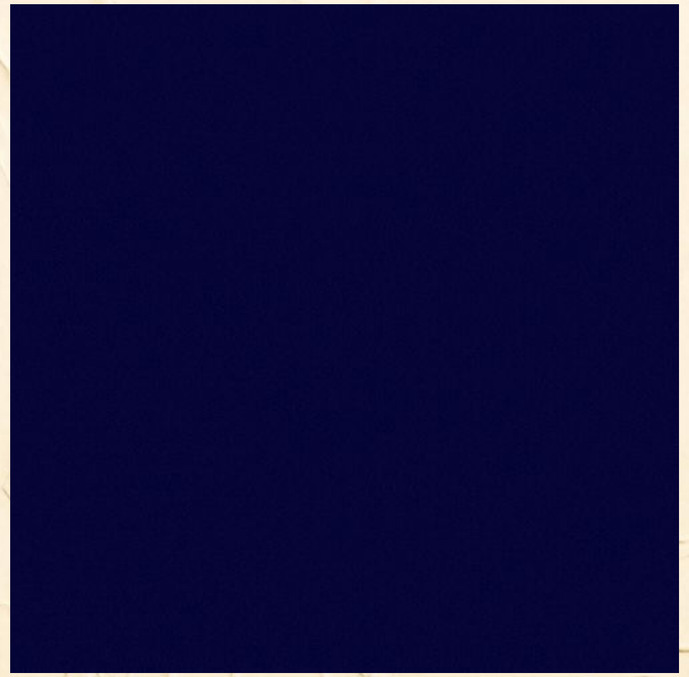
TEAM CELESTIALS

PROJECT ON CELESTIAL MECHANICS



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AIM OF THE PROJECT

To study, compare and analyse conventional and non-conventional parameters like inclination, argument of periapsis etc. of planetary systems belonging to different classes of stars based on Keplerian mechanics.

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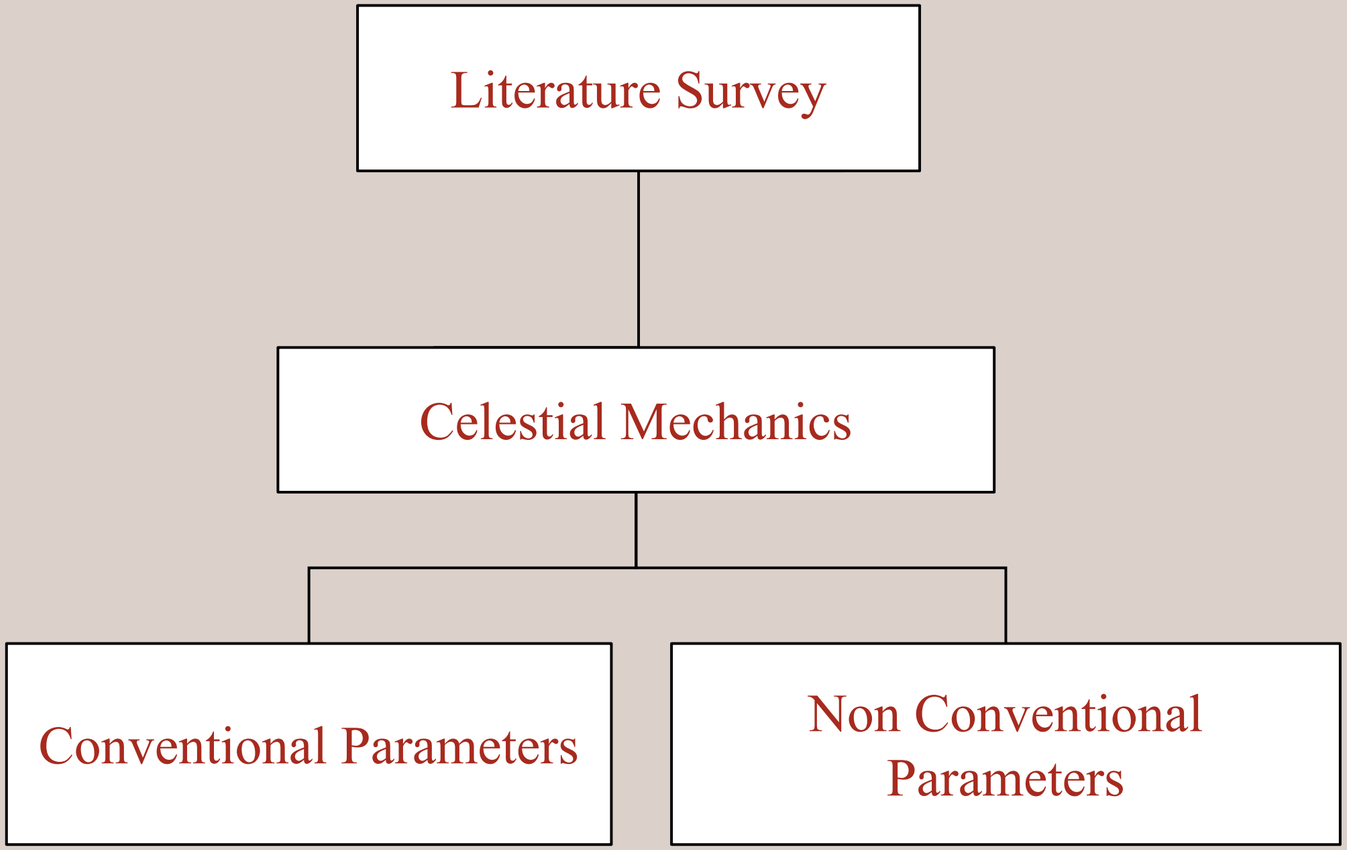
- Literature Survey
- Data Handling
- Analysis of Data
- Plots and Results
- Inferences

LITERATURE SURVEY



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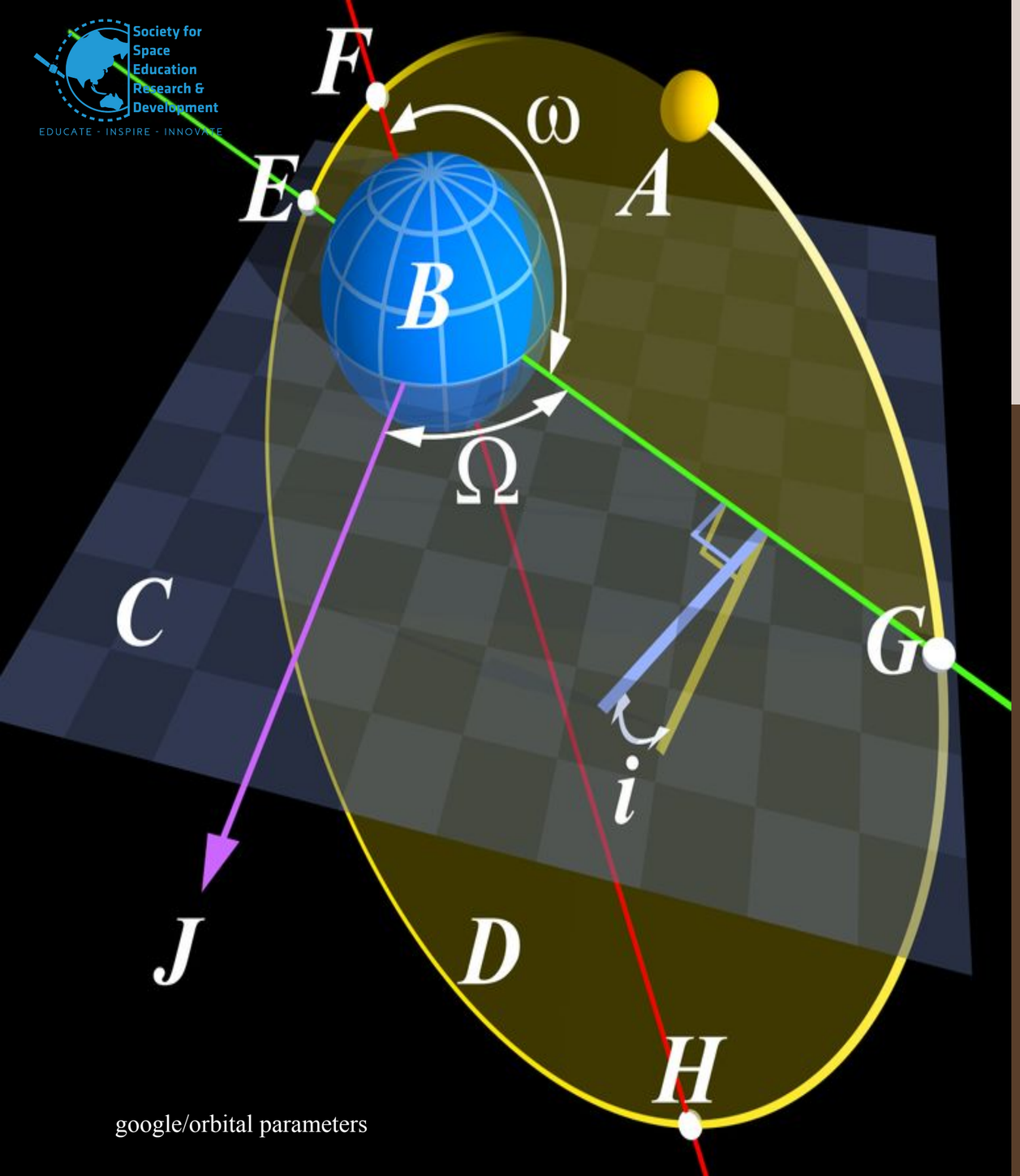
LITERATURE SURVEY

BOOKS

- FUNDAMENTAL OF ASTRONOMY (H. Karttunen, P. Kröger,H. Oja,M. Poutanen,K. Donner)

PAPERS

- Stellar obliquities in exoplanetary systems (Simon H. Albrecht,Rebekah I. Dawson, Joshua N. Winn)
- On the tidal interaction of massive extrasolar planets on highly eccentric orbits(P. B. Ivanov)
- On the Inclination and Habitability of the HD 10180 System(Stephen R. Kane, Dawn M. Gelino)
- Exoplanet Detection Methods(Jason T. Wright and B. Scott Gaudi)



google/orbital parameters

CELESTIAL MECHANICS

- Study of motions of celestial bodies
- Explains and predicts the motions of planets and their satellites.

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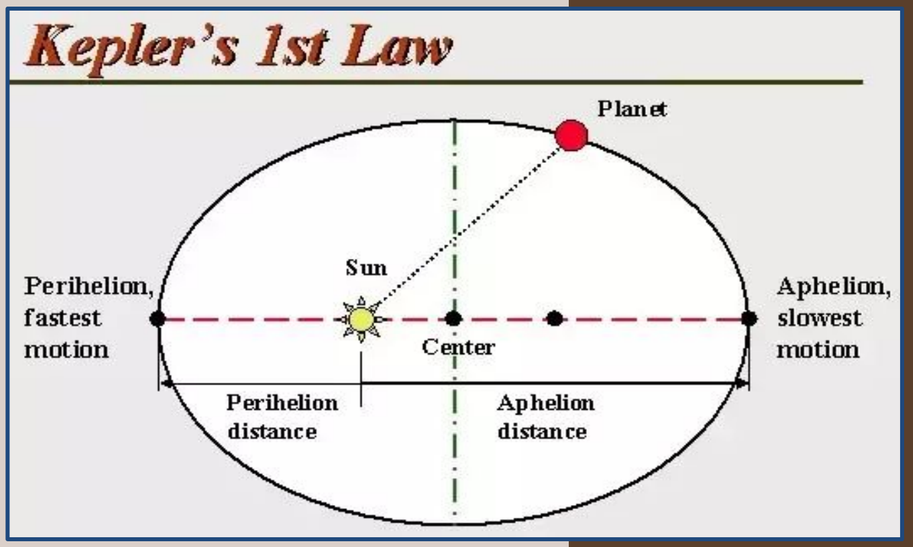
KEPLER'S LAWS

First law:

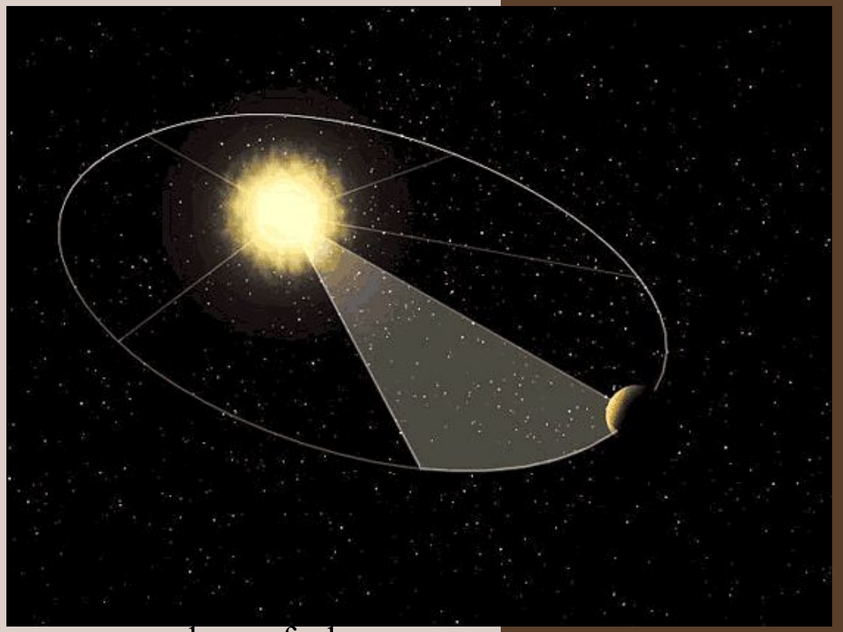
Planetary orbits are elliptical with the sun at a focus.



www. quora.com

Second law:

The radius vector from the sun to a planet sweeps equal areas in equal times.



phys.uaf.edu

Third law:

The squares of the orbital periods of the planets are directly proportional to the cubes of the semi-major axes of their orbits

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CONVENTIONAL ORBITAL PARAMETERS

- Semi Major Axis (*a*)
- Semi Minor Axis (b)
- Eccentricity (e)
- Orbital period (*T*)

NON CONVENTIONAL ORBITAL PARAMETERS

- Obliquity (**λ**)
- Inclination (*i*)
- Longitude Of Ascending Node (**Ω**)
- Argument Of Periapsis (**ω**)
- Time Of Periapsis
- Anomalies

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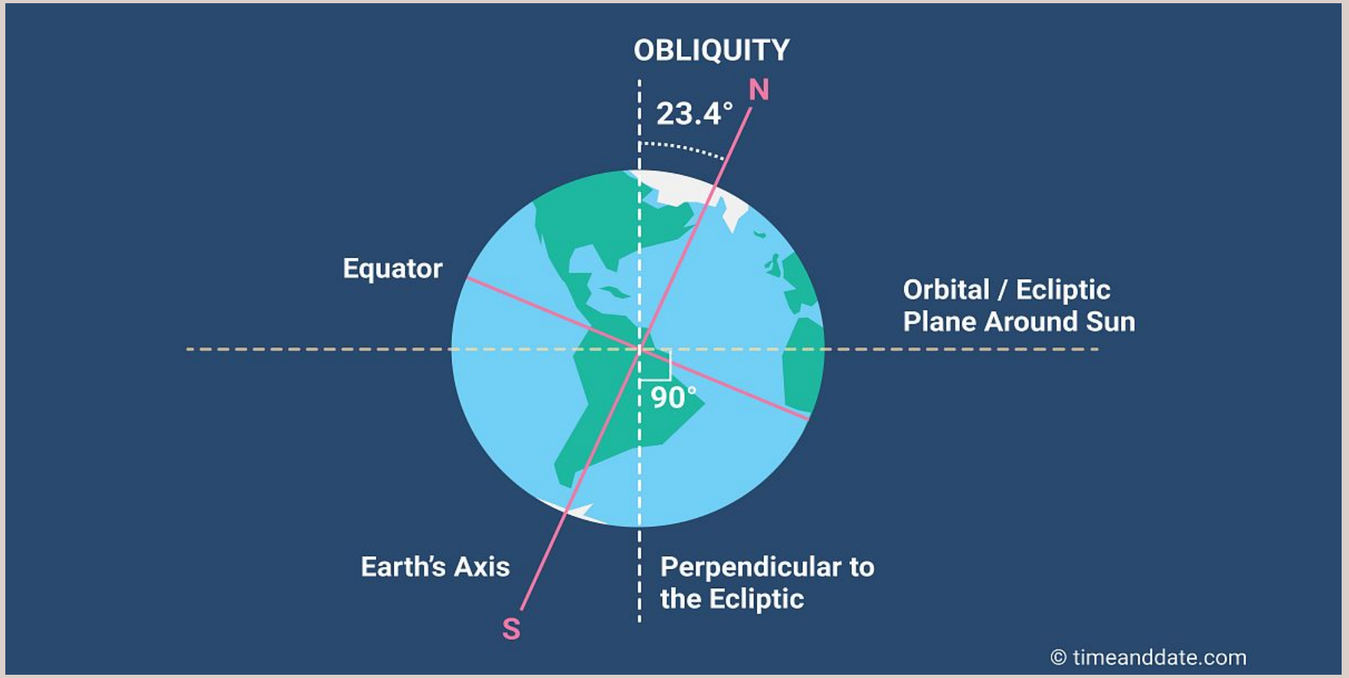
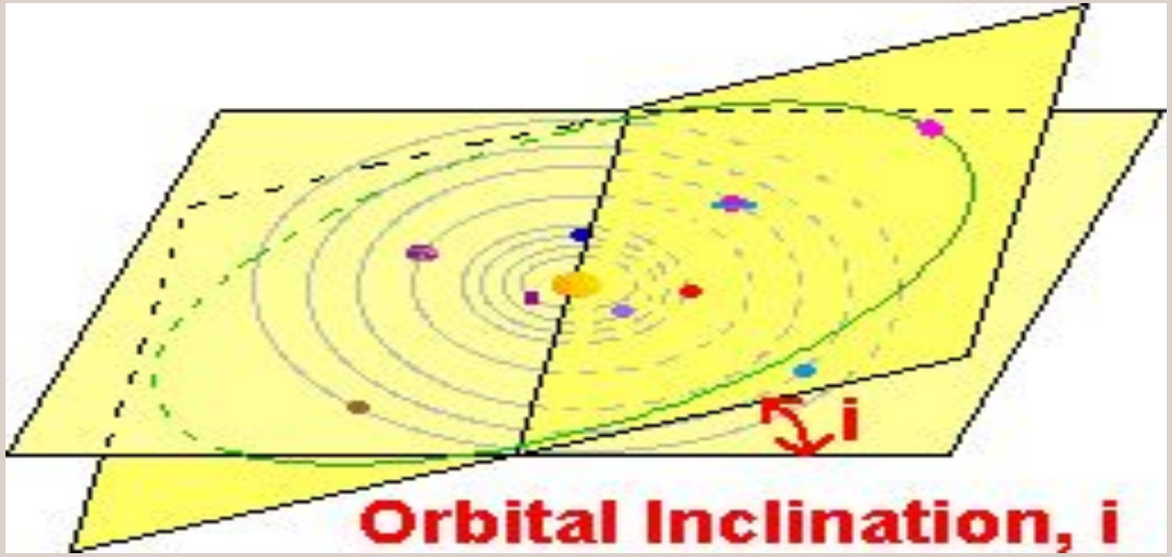
1. Obliquity (λ)

Angle between planet's equatorial plane and its orbital plane.



2. Inclination (i)

Angle between a reference plane and the orbital plane of the planet.



enchantedlearning.com

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3. Longitude of Ascending Node (Ω)

Ascending node ⇨ Point where orbital plane of the planet intersects ecliptic (while going Northwards).

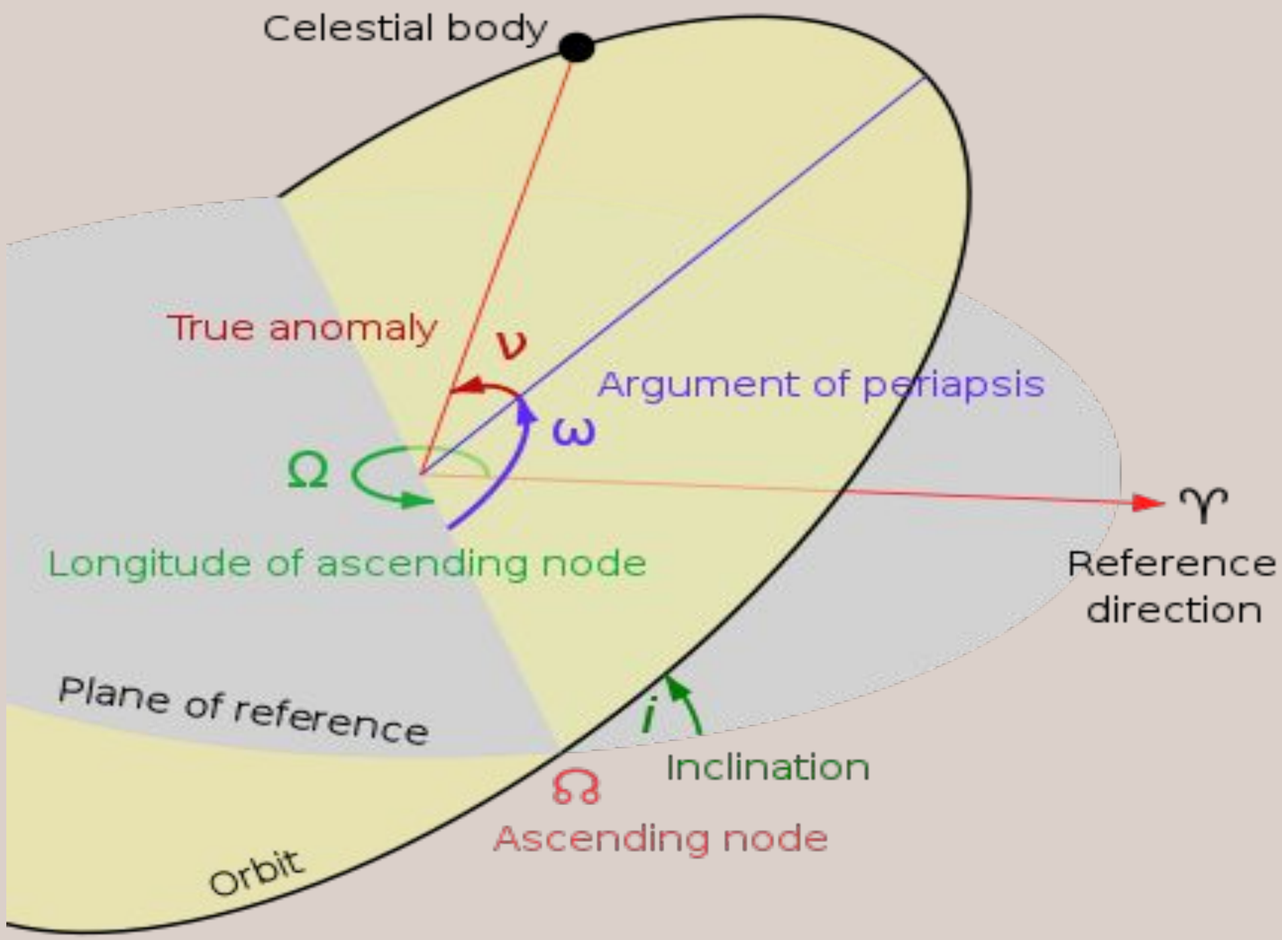
Longitude of Ascending Node ⇨ Angle from reference direction to the ascending node direction.

4. Argument of Periapsis (ω)

Angle from ascending node to periapsis in the direction of motion.

5. Time of Periapsis

Any date at which the planet was known to be at periapsis.



en.wikipedia.org

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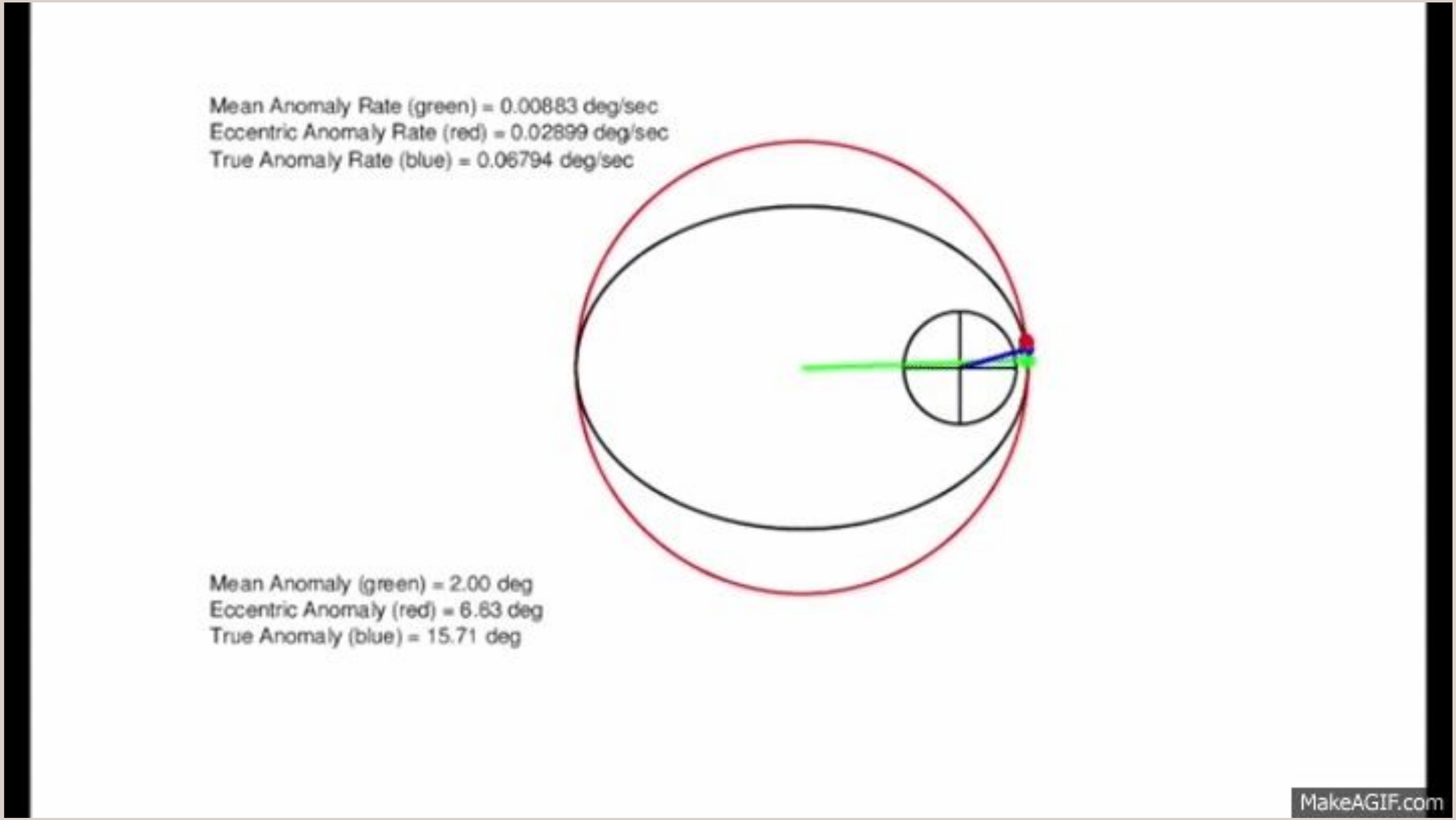
6. Anomalies



True, Eccentric and Mean Anomalies are three types of Anomalies.

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DATA HANDLING

- Collected data from :

  http://www.exoplanet.eu/catalog/

  https://www.princeton.edu/~willman/planetary_systems/
- Analysed the data using python.

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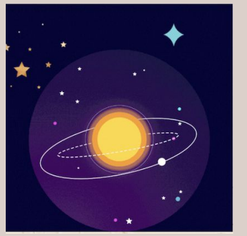
ANALYSIS OF DATA



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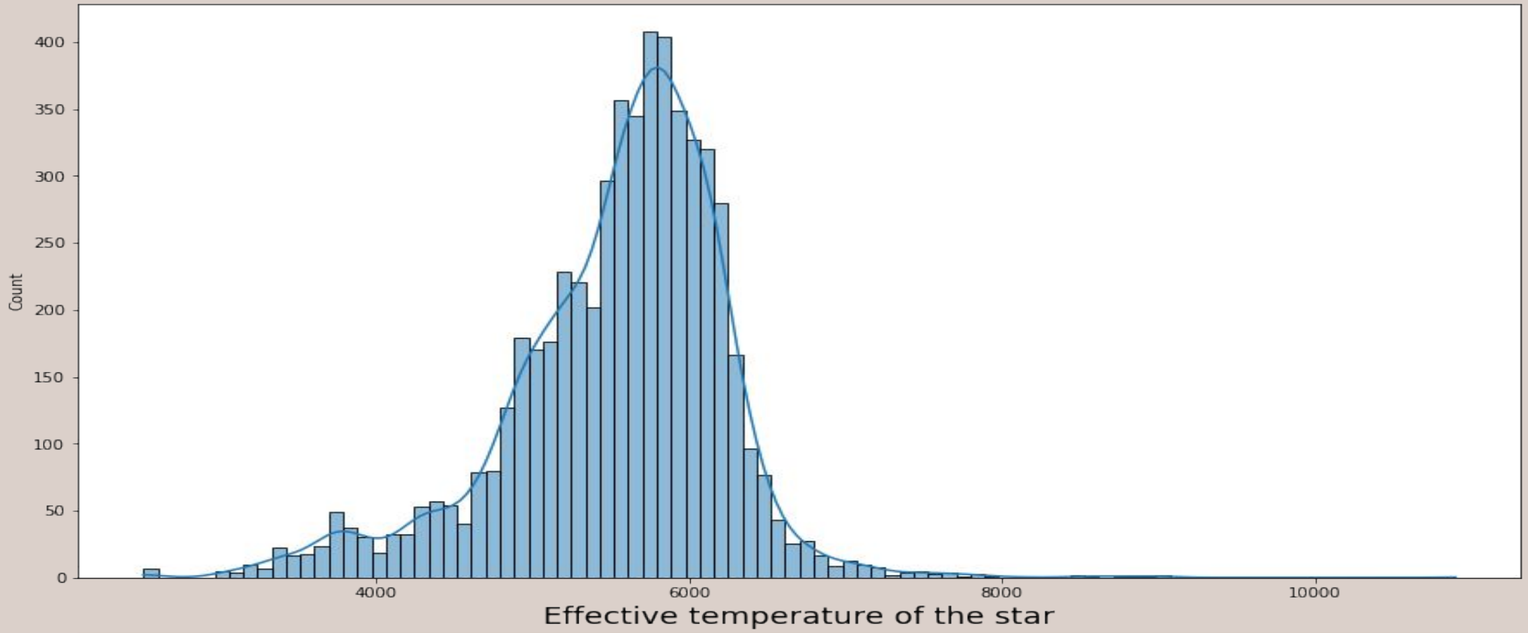

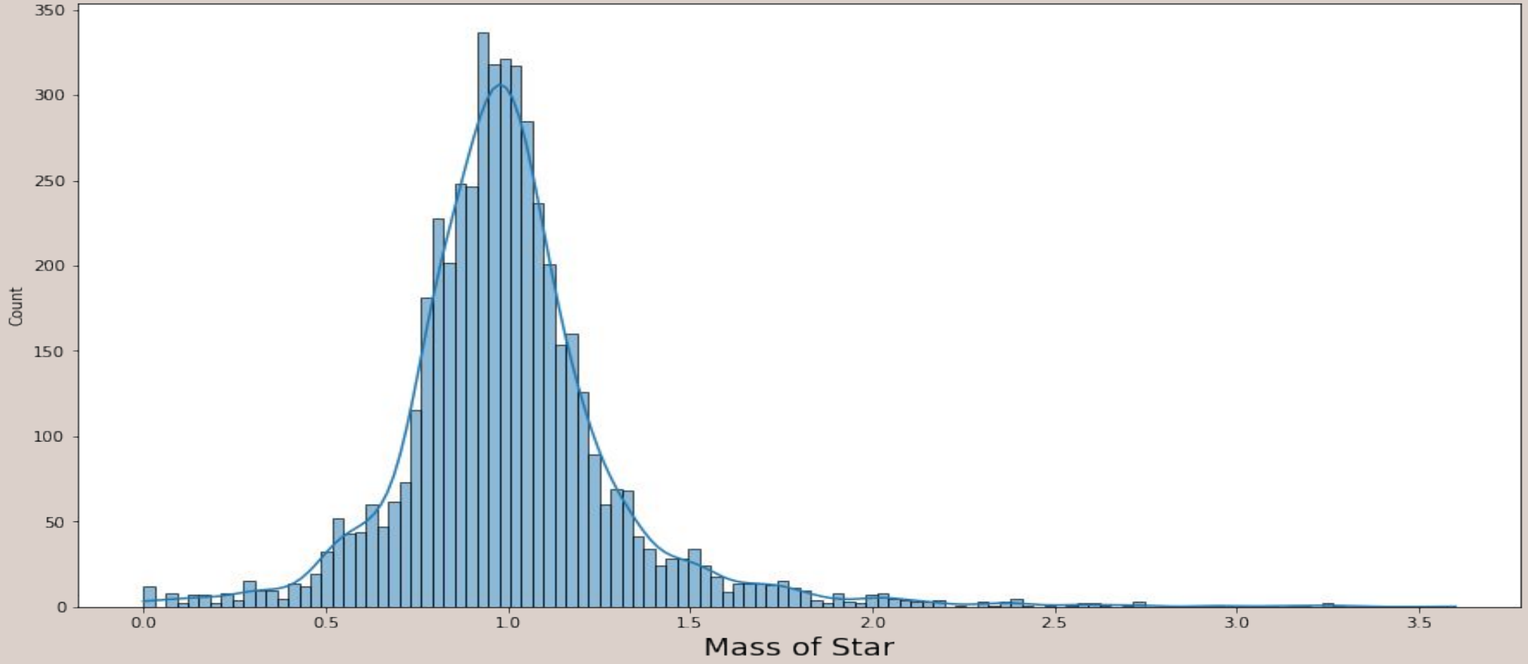

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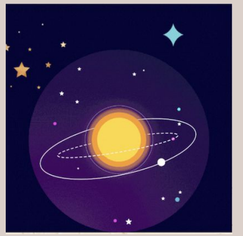

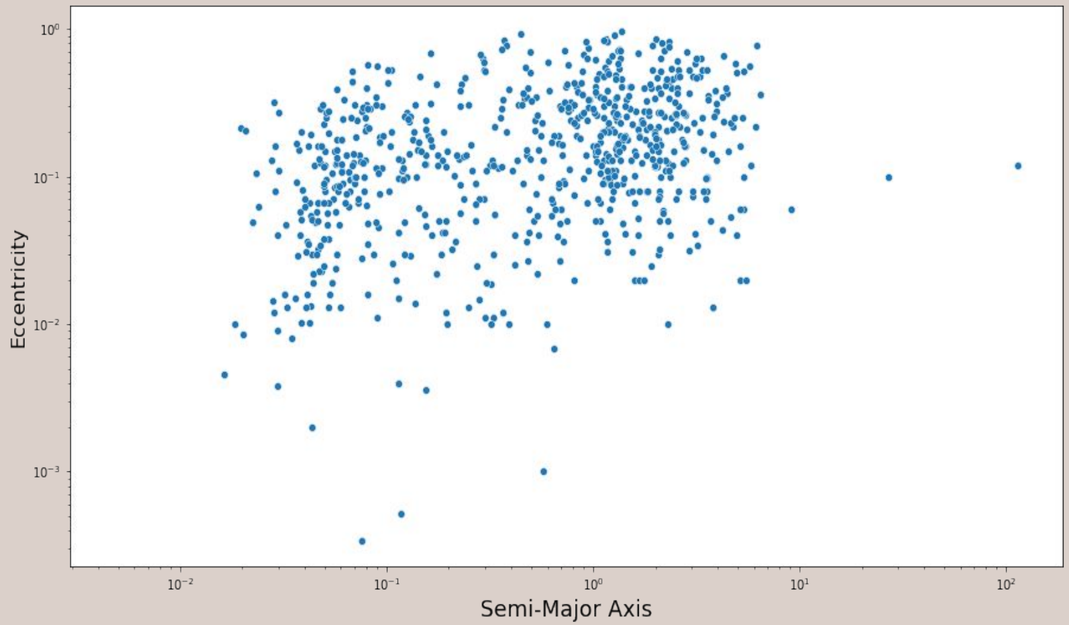

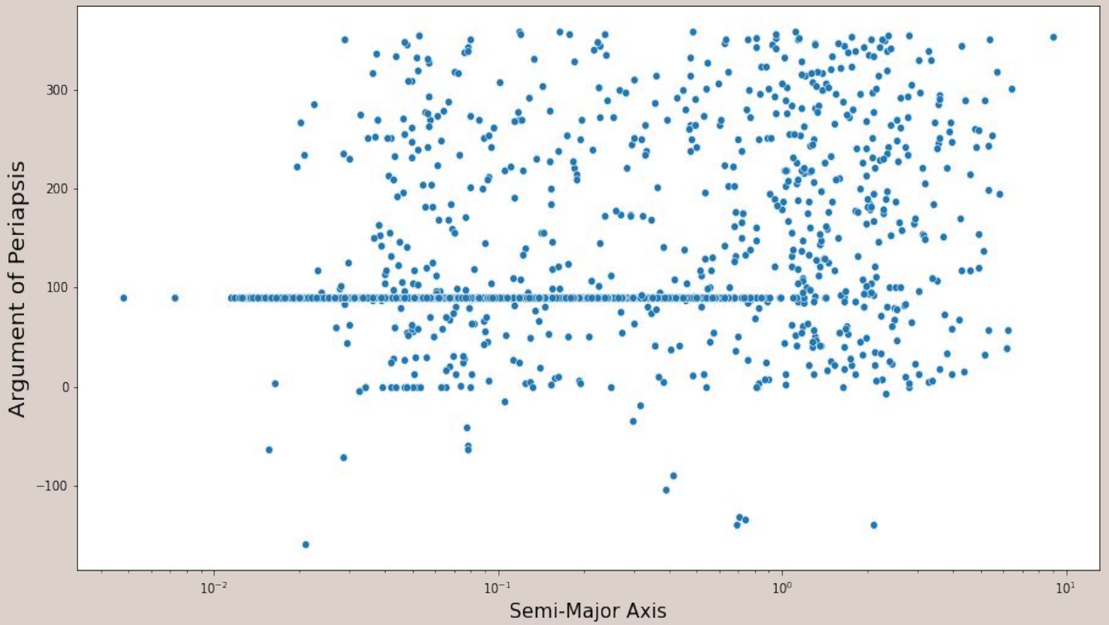

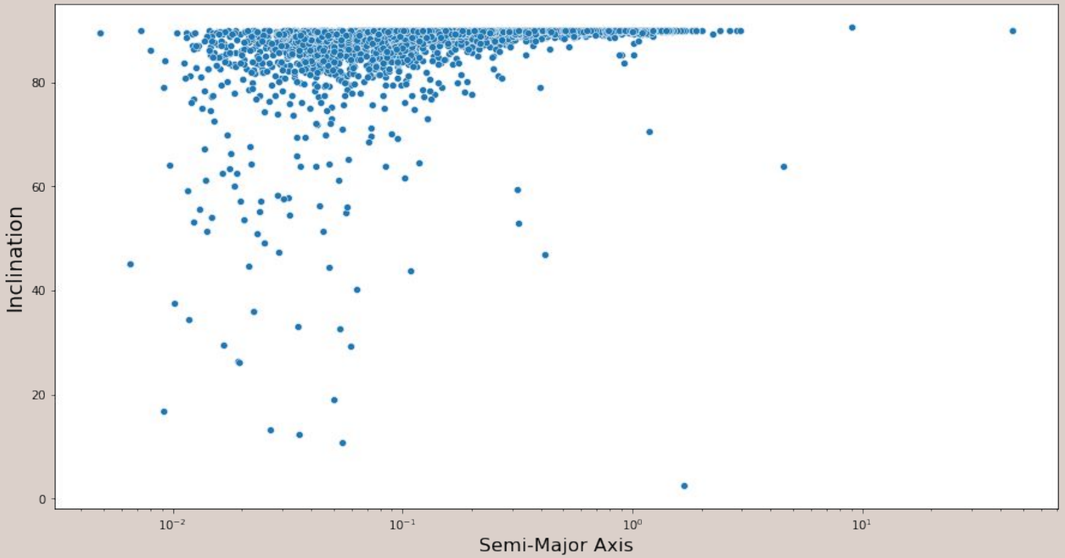

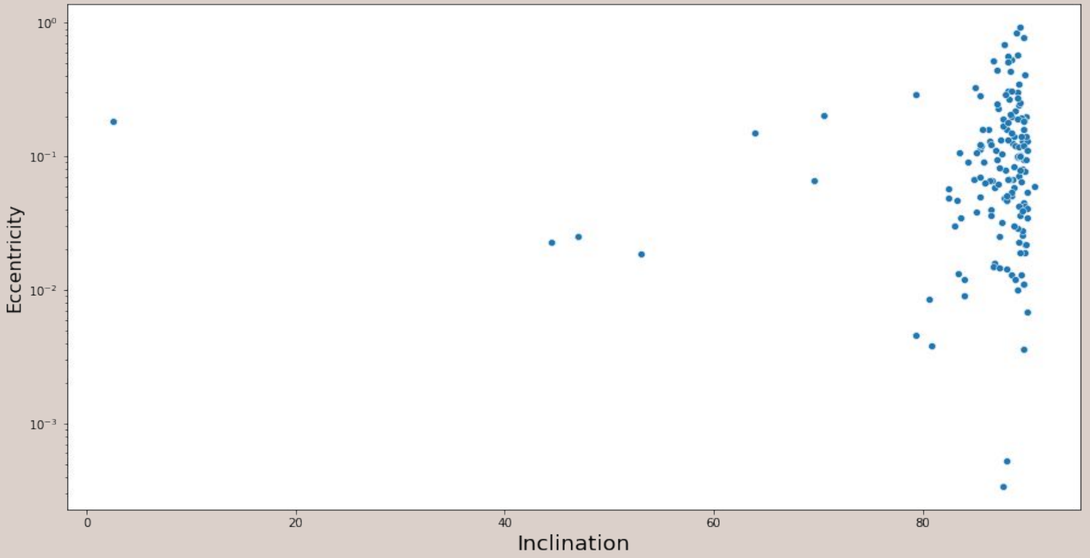

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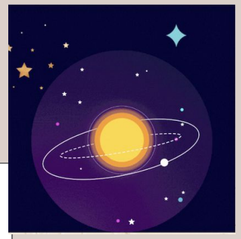

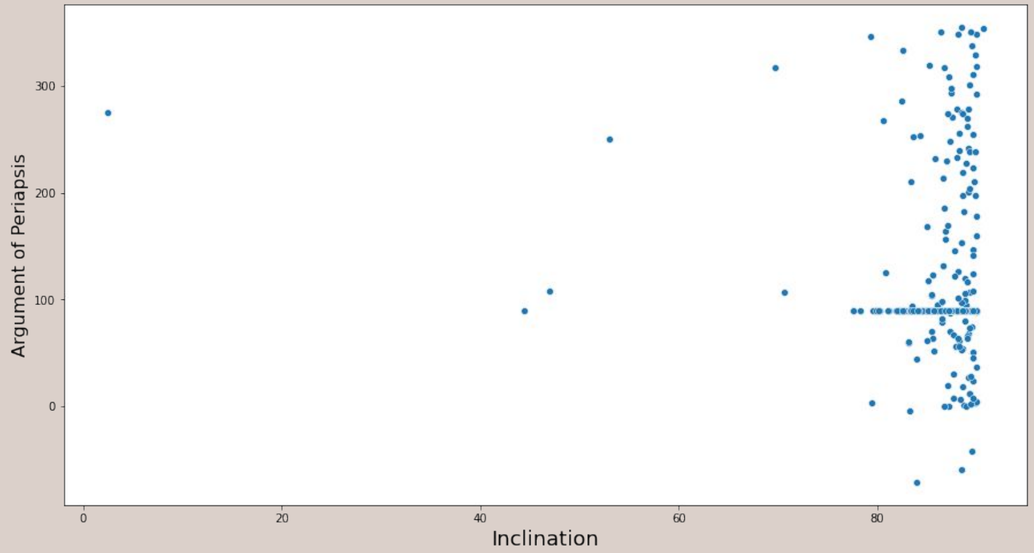

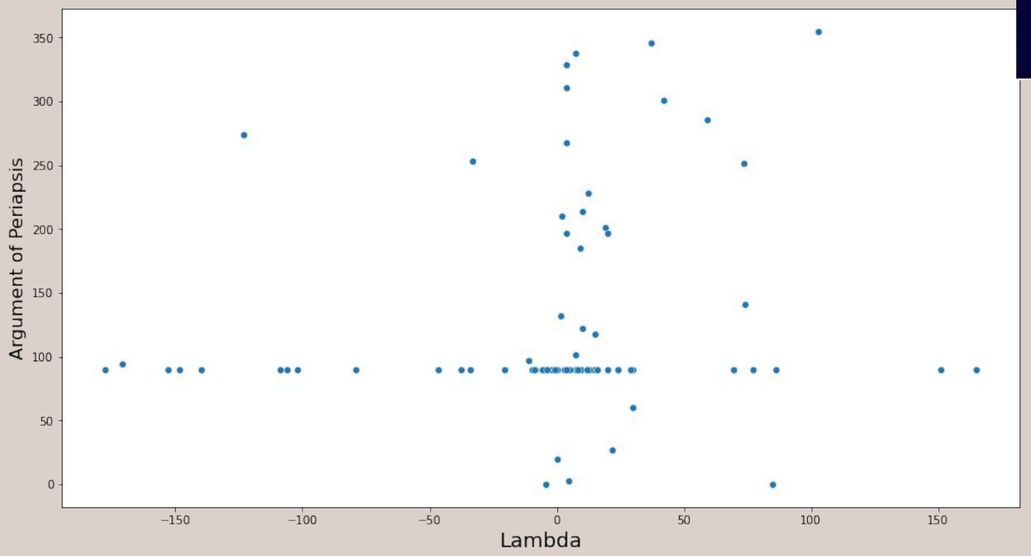

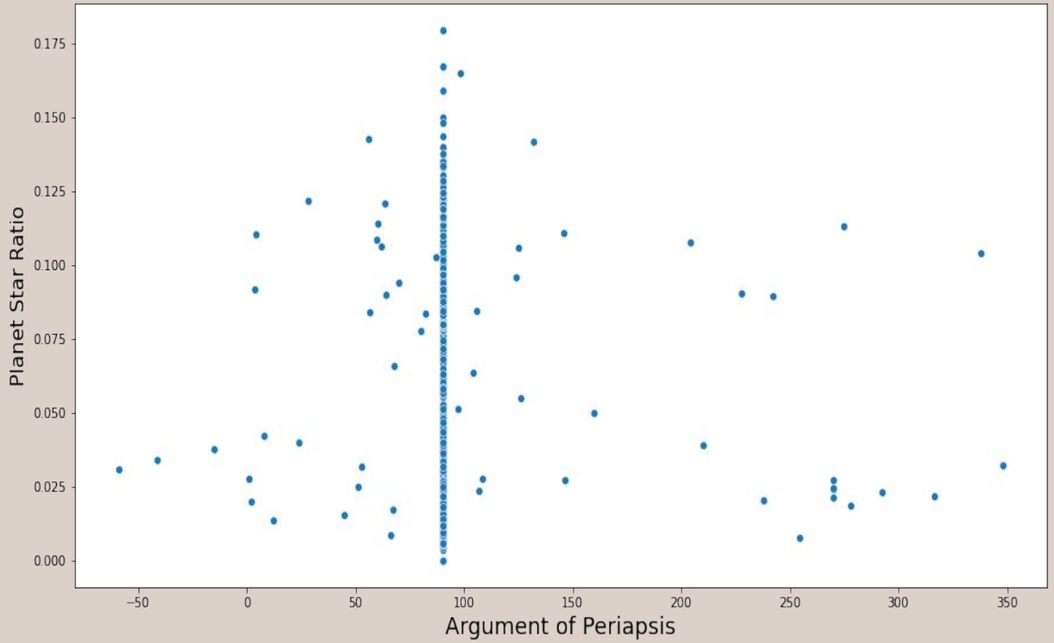

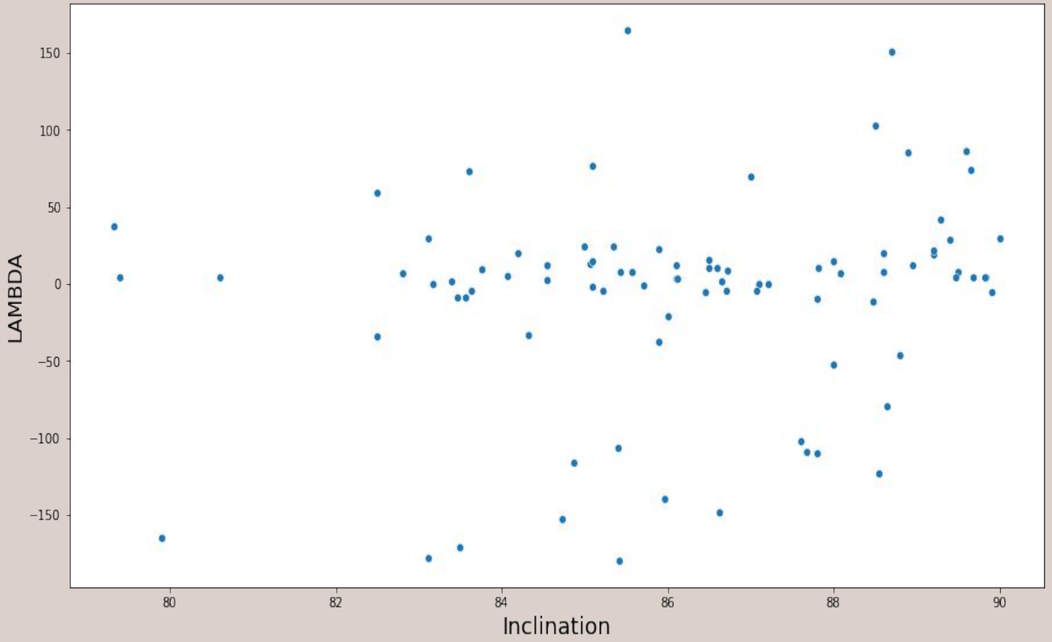

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ACKNOWLEDGMENT

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