# **DS 3000 – Project Summary**

**Overview**

Thousands of small bodies are found in our solar system at any given time. Often, the orbits of these small bodies come close to planets, including the earth and many major satellites. Nearly 20 major satellites are currently orbiting at four Lagrange points for the Earth-Moon and Earth-Sun systems, with many more missions planned for the same areas. Thus, any asteroid or object that comes near these points poses a great threat to astronomical research and weather observations on Earth. The dataset we have contains names, object classes, and approach distances to Earth for various asteroids and comets. The approach distance and classification can be used to determine a threat level for various objects.

**Questions/Hypotheses**

* What asteroids are a high or low threat to hitting satellites orbiting earth?

<https://en.wikipedia.org/wiki/Lagrangian_point#Sun%E2%80%93Earth>

* We park things 326400 km (earth-moon L1, artemis) away, 448900 km (earth-moon l2, 3 things), 148110 km (sun-earth l1, 6 major satellites there), 151100 km (sun-earth l2, 7 major satellites there)
* Our hypothesis is that asteroids less sun-earth L2 (151100 km) from earth have the highest chance of hitting satellites. The null hypothesis is that all asteroids have the same chance of hitting satellites.
* We hypothesize that the smaller the distance from earth, there is a higher chance of hitting a satellite.

**Data Analysis Plan**

* We have one major independent variable, distance, that would help us determine the threat classification of the asteroid. For now, we will go with a independent-samples t test. However, a different test might prove to be more practical or useful later on, so we will compare.
* We are planning to predict the asteroids that will pose the greatest threat to destroying satellites orbiting earth based on distance from earth. Therefore, we want to use machine learning techniques to predict the threat asteroids have. This will be trained with the asteroids data by saying the asteroids with close approaches are high threat and all other asteroids are low threat. Then, a user could input a distance from Earth, and we would predict high or low threat.