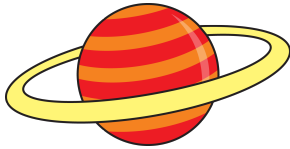


UW Math Circle
October 5, 2017
Homework

We think of a **graph** as a set of dots (vertices) with edges between them, where each edge is attached to exactly two vertices.

1. Due to some recent galactic advances, transporters allow you to make the following jumps between planets: Earth–Mercury, Pluto–Venus, Earth–Pluto, Pluto–Mercury, Mercury–Venus, Uranus–Neptune, Neptune–Saturn, Saturn–Jupiter, Jupiter–Mars, and Mars–Uranus. Is it possible to travel from Earth to Mars?



2. In the faraway country of Septiland, there are 15 cities. Each city is connected to at least 7 other cities by a road. Show that it is possible to drive between any two cities, possibly passing through some other cities along the way.
3. (a) At a campground, there are paths between the campsites. A path goes straight from one campsite to another, there are no forks in a path (but a campsite can have multiple paths entering it). Wherever a path enters a campsite, there is a large stone. What can you say about the total number of stones?
(b) What can you say about the number of campsites that contain an odd number of stones? (If a campsite contains an odd number of stones, there are an odd number of paths leaving it).

