## 29:52 Exploration of the Solar System Homework Assignment \# 10 <br> Quiz must be completed on ICON by 8 AM, Monday, April 19

1. Which of the following properties of Pluto demonstrates that it is not a major planet? Pick the best one.
(a) semimajor axis
(b) eccentricity
(c) surface temperature
(d) mass
(e) chemical composition
2. The semimajor axis of the the orbit of Pluto is 39.5 au , while that of Neptune is 30.1 au . How is it possible that Pluto comes nearer to the Sun than Neptune?
(a) its eccentricity is 0.25
(b) the semimajor axis changes with time; it comes closer when the semimajor axis is smaller
(c) the orbit of Pluto is highly inclined with respect to the ecliptic
(d) the semimajor axis of a Kuiper Belt object has a different significance than that of a major planet
(e) Neptune shows large excursions outside of its elliptical orbit
3. Pluto is a member of one of the following categories of astronomical object. Which is it?
(a) major planet
(b) dwarf planet
(c) satellite
(d) Oort Cloud object
(e) HII region
4. The spacecraft New Horizons will encounter Pluto in July, 2015. What will its average speed be for the remainder of its voyage? Hint: you will have to find some supplementary information (i.e. outside the textbook) on this one.
(a) $25 \mathrm{au} /$ year
(b) $300,000 \mathrm{~km} / \mathrm{sec}$
(c) $30 \mathrm{~km} / \mathrm{sec}$
(d) $0.25 \mathrm{au} /$ year
(e) $3 \mathrm{au} / \mathrm{year}$
5. Is the so-called $\beta$ (Beta) ring of Uranus inside the Roche Distance for that planet? To answer this, use Figure 13.12 of the textbook. Be sure you under-
stand the reason for your answer.
6. When Pluto is near aphelion, what would you expect its temperature to be?
(a) $<5 \mathrm{~K}$
(b) $<40 \mathrm{~K}$
(c) between 60 and 100 K
(d) $150-200 \mathrm{~K}$
(e) 290 K
7. Think about the orbits of Earth and Mars. Which one would you expect to have an orbit which is a more mathematically precise ellipse, and which has parameters of the ellipse which are more constant with time? What are your reasons?
8. Think about the satellite Io. Which moon is in a $2: 1$ resonance with Io?
(a) Ganymede
(b) Callisto
(c) Europa
(d) Titan
(e) Triton
9. Why is Saturn's moon Enceladus of interest?
(a) it has geysers of water
(b) there are no impact craters on the surface
(c) it is the most distance moon known in the solar system
(d) it is in a retrograde orbit
(e) it has an atmosphere
10. Why is Saturn's moon Titan of interest?
(a) it has a surface with many impact craters
(b) it is in a retrograde orbit
(c) it is completely encased in water ice
(d) there are lakes or oceans of methane on the surface
(e) it is far younger than any other major solar system object
