ASTR1050
Fall 2025

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Due Date: 19 September, 11:59 PM

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1. **An asteroid is observed to orbit slightly ahead of the orbit of Jupiter. Which best describes this object?**

    a. Galilean moon

    b. Centaur

    c. Near-Earth object

    d. Trojan

2. **Which planet in the Solar system is the only known planet to rotation clockwise, viewed from its North Pole?**

    a. Uranus

    b. Neptune

    c. Venus

    d. Mercury

3. **How is the Moon thought to have formed? No need for more than a few sentences.**

4. **At what time (approximately) will a Third quarter Moon cross the meridian?**

5. **Io, a moon orbiting Jupiter, is tidally locked to Jupiter. If Io's radius is 1.82×10^6 m and its rotational period is 1.77 days, calculate Io's rotational rate in km s^{-1}.**

6. **The Earth's angular momentum is deposited into the Moon's orbit by tides, lengthening the day by 24 μs (microseconds) per year. What was the length of Earth's day $2,000$ years ago? Assume the length of the at present is exactly 24 hours. Hint: There are 10^6 μs in one second.**

7. **If a man weighs 180 lbs on Earth, how much does he weigh on the surface of Mars, in pounds? Mars has mass 0.107 times the mass of the Earth, and radius 0.531 times the radius of the Earth. Hint: you do not need to convert pounds to kilograms, and then back into pounds again. Use scaling relations.**

8. **Jupiter has orbital semi-major axis of 5.20 AU. Find it's orbital speed using Newtonian dynamics. The Sun has mass 2×10^{30} kg, there are 1.50×10^{11} m in 1 AU, and Newton's gravitational constant is $G = 6.67 \times 10^{-11}$ N m^2 kg^{-2}.**

9. **Find the acceleration due to gravity on the surface of the Moon. The Moon has mass 7.35×10^{22} kg, radius 1.74×10^6 m and Newton's gravitational constant is $G = 6.67 \times 10^{-11}$ N m^2 kg^{-2}.**

10. **Why does the Earth have a magnetic field, but the Moon does not?**