Astronomy 301 – Fall 2019

Homework 2

Due Date: Wednesday, September 18, 2019, 9:00 AM

You must turn in your homework answers electronically via Canvas. A .pdf or .docx file would be best, but if you can get a good image of your hand-written homework, a .jpg or .png file would okay also. Make sure your name and eid appear at the beginning of your homework.

We encourage you to work together on the homework but you are not allowed to copy from each other. You must write out the answers in your own words.

1. a) The Earth and the moon formed at nearly the same time, but the oldest moon rocks are about 4.6×10^9 years old while the age of the oldest Earth rocks is only about 3.7×10^9 years. Why are the oldest moon rocks older than the oldest Earth rocks?

   b)The North American plate and the African plate are currently separating at a rate of about 3 cm per year and are now separated by about 4500 miles. Roughly how long ago did the North America separate from Africa?

2. If the half-life of a radioactive element is 1×10^9 years, and a crystal contains 1/2 of its original quantity of that element, how old is the crystal? How old is the crystal if 1/8 of the original quantity is left?

3. How do the craters on the Earth, the Moon, and Mars differ? Assuming that the craters on all three bodies were originally similar, why are they different now?

4. What is the best evidence that there used to be free-flowing water on the surface of Mars? What might have happened to the water?

5. Name Jupiter's four Galilean moons in order from the closest to the most distant from Jupiter. Give a distinctive characteristic of each moon. Why does the closest moon have such strong tectonic activity?