

## Assignment 2

### Instructions:

Type your answers, and only your answers (do not copy the questions), in the body of the email to [geog345@gmail.com](mailto:geog345@gmail.com). In the subject line, type "Assignment 2" (without the quotes).

This assignment must be submitted by **Thursday, September 18, 11:59** pm EST (i.e. before midnight). Late assignments will be deleted. Please only submit your completed assignment once.

1. Type your last, first name

2. Copy and paste the honor pledge:

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment. (Add your initials).

3. Faint young sun: Four billion years ago, the Solar Luminosity was thought to be 70% of the present value of  $3.84 \times 10^{26}$  W. If the surface area of the sun has remained the same ( $6.0877 \times 10^{18}$  m<sup>2</sup>), what was the temperature of the Sun four billion years ago? Round your final answer to the nearest degree K.

4. How much more power per square meter (in percent) is received at the Tropic of Capricorn at noon on the December Solstice versus the Tropic of Cancer at noon on the June Solstice? (Perihelion = 147.09 million km, Aphelion = 151.92 million km). Assume that perihelion and aphelion roughly coincide with the solstices. Round your final answer to the nearest tenth of a percent.

5. At which latitudes does the solar insolation equal one quarter of the solar constant at 8:00 AM on the March Equinox? (hint:  $\cos(\phi) = \cos(-\phi)$ ).

6. How far north in the must I go (what latitude) for it to be possible to have 16 hours of daylight in the northern hemisphere? Round your final answer to the nearest degree latitude.

7. How much thermal energy in joules must be applied by 1000-tonne iceberg at  $-10^\circ$  C to completely melt it? The latent heat of fusion for water is 334,000 J/kg, the specific heat of ice is 2100 J/(kg·K). Report your answer in gigajoules (GJ) where  $1 \text{ GJ} = 10^9 \text{ J}$ .

8. What is the density of air when the pressure is 1040 mb and when the temperature is  $35^\circ$  C? Round your answer to the nearest hundredth.