This lab borrowed and modified from Lab Exercise 19 at http://wps.pearsoned.com/esm\_thomsen\_apg\_9/246/63020/16133246.cw/content/index.html

For your convenience, I have italicized and underlined the questions you need to answer. Work through the lab and answer the questions. Then goto Canvas and take the lab 4 quiz (which is based on the below questions). You don’t hand anything in, just take the quiz.

**Plate Tectonics: Global Patterns**

***Part 1: San Andreas Fault and Plate Motion.***

1. The average rate of motion across the San Andreas fault zone during the past 3 million years is 5.6 cm/yr. *How far apart are San Francisco (assume the Golden Gate Bridge) and Palm Springs (the location of the pin that appears if you search for “Palm Springs, CA”, in kilometers*? *How many million years will pass until they are sister cities across a new bay?* Remember, use the ruler to get distance (and you can set the units). And that there are 100,000 cm in a kilometer. And 100 cm in a meter; and 1000m in a kilometer. Also, if you don’t know where a particular location is, just do a search for it!

2. The 1906 San Francisco earthquake resulted in a maximum 8.5m (28 ft) of movement along the San Andreas Fault around Point Reyes. *How many years of stress were relieved by the 1906 earthquake, if the speed of movement should have been 5.6 cm/yr?*

3. If that section of the fault has not moved since 1906*, how many centimeters of stress have accumulated, assuming a speed of movement of 5.6 cm/yr*? Give your answer assuming a time from 1906-2016 (110 years).

***Part 2: Hawai‘i and the Emperor Seamounts.***

Turn on the Hawai’i data in Google Earth (check the box)

The Hawai‘i–Emperor Seamount chain has been formed by a plume of magma upwelling

from the mantle and burning through the crust as the crust moves over this hot spot.

4. *What is the linear distance from the hot spot’s present location to the Meiji Seamount (use the ruler tool)?* In kilometers. The current location of the hot spot is Loi’hi.

5. *The age of Midway Island is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.* Note, “my” stands for millions of years. *) The distance from Midway to the active hot spot is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* (use the ruler tool to determine the distance in kilometers).

6. Given these values, *what is the average speed of the Pacific Plate movement per year, in centimeters, over this time frame?* The time frame being the formation of Midway Island to present. If you know time elapsed and distance, you can get a rate. Remember, speed is distance over time. You will need to covert your answer into cm per one year. There are 100cm in a meter, and 1000m in a km.

The Meiji Seamount is just south of the Kuril-Kamchatka Trench, where many seamounts have been subducted. The movement of the Pacific Plate shifted direction approximately 40 million years ago and is moving in a west-northwest direction. It is more likely that the present Hawai'ian Islands will eventually subduct in the Japan trench.

7. *What is the linear distance from the hot spot’s present location to the Japan Trench* (go with the trench location closest to Tokyo? In kilometers

8. Given the distance from the hot spot to the Japan Trench placemark, and the speed of movement that you calculated above, *how many millions of years will it take for the big island of Hawai'i to subduct into the Trench?*