

Name: _____ Section: _____

Homework Assignment #4 (Due in Sections Week of Feb. 12)

- 1) A frictionless projectile is fired from the North Pole and is aimed along the prime meridian. It takes 3 hours to reach its landing point, halfway to the equator. Where does it land? (Give latitude and longitude). If the same projectile is fired from the Equator due East, under the same circumstances, where does it land? (Give latitude and longitude).
- 2) If we were to look at sea surface height across the North Atlantic basin, there would be a “hill” to one side with a steep slope on the western side of the basin, and shallower slope on the eastern side. Explain (a) why there is a “hill”, and (b) why it isn’t centered in the middle of the basin.
- 3) If the production of North Atlantic Deep Water were severely reduced, what changes would you expect to find in the (a) Gulf Stream flow; (b) upwelling the Pacific ocean; (c) world sea surface temperatures?
- 4) In Homework 2, you compared the geology of the California coast with the geology of the Northwest African and Iberian (Spain and Portugal) coasts. Based on the material we covered on atmospheric and oceanic circulation, what regions of the planet would you expect to be similar oceanographically (biology, physics, chemistry) to California? Why?
- 5) If the earth were to spin at twice its current velocity (once every 12 hours), and the shape of the earth was **cylindrical** instead of spherical, describe the large scale current patterns for the North Atlantic (hint: think about what would happen to geostrophic flow, Ekman pumping, Coriolis, and vorticity).

Extra Credit: Choose ONE of the following extra credit questions. You must answer the entire question correctly to get the extra credit.

1. (3 points) What is the Coriolis parameter? How does it vary from the equator to the North Pole? What is the Coriolis parameter at 0°, 30°, 60°, 90°, and Santa Cruz? How does the Coriolis parameter relate to vorticity?
2. (2 points) Draw a map of the Pacific Ocean and name the major currents. You must include at least 10 currents for a complete answer.