The American University of Beirut
Department of Geology
Global Tectonics (Geol 310)

Fall 2005-2006: Final Examination
Dr. Maya El-Kibbi
Time: 3 hours

Pledge

Exam rules apply.

I. - Based on the diagrams below, compare proposed driving mechanisms of plate tectonics.   **(12 pts)**

  - Which mechanism appears to be more significant today? Defend your answer. **(8 pts)**

II.   - Give the main characteristics of the mantle transition zone.   **(7 pts)**
         - Explain the effect of the nature of the mantle transition zone on the vertical extent of mantle
           convection.   **(7 pts)**
         - Draw a LABELED diagram to illustrate your explanation.   **(6 pts)**

III.   - Briefly discuss the geometric model behind the depth-age relationships (given below) and
           define the variables *(d)* and *(t)*.   **(5 pts)**

$$d = 2500 + 350\sqrt{t}$$
$$d = 6400 - 3200\exp(-t/62.8)$$

         - Explain why this model applies to ocean ridges and draw a simple sketch to illustrate your
           answer.   **(5 pts)**

IV.   - Explain how seismic tomography of the mantle (including anisotropy modeling) can contribute
           to our understanding of the motion of the plates.   **(20 pts)**

V.   - In your opinion, what is the importance of the notion of **fixed** hotspots in studying plate
           movements? **(7 pts)**
         - What is the significance of using a geomagnetic polarity timescale in studying plate motions?
           (7pts)
         - How can you relate the significance of the notion of **fixed** hotspots to that of reversals of the
           geomagnetic field?   **(6pts)**

VI.   Consider the figure below: **(10 pts)**
- Using graph paper, draw a velocity vector diagram showing the configuration of the plates.
- Calculate the relative motion between plates A and B.
- Draw arrows at each plate boundary to show motion of each plate relative to the other.
- Analyze the stability of the triple junction. Label the velocity lines.