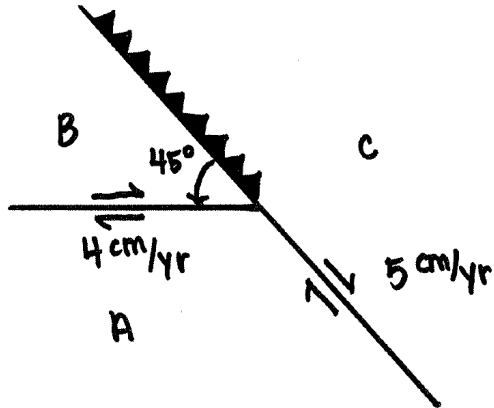


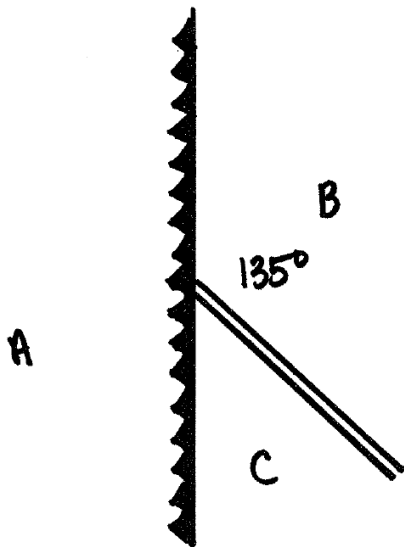
EPS 122: Physics of the Earth and Planetary Interiors
Problem Set 1: Plate motions and rotations

1. For the following two figures determine the unknown plate velocities and azimuths. Are the triple junctions stable?

a)



b) In this example ${}_a v_b = 5 \text{ cm/yr}$ with an azimuth of 270° (i.e. 270° measured clockwise with respect to north which is up) and ${}_b v_c = 4 \text{ cm/yr}$



2. Ares is a planet with just two plates, A and B (see figure). Plate B comprises the lower hemisphere and plate A the upper, as shown. Points a, b and c lie on the equator, and point d is diametrically opposite b. The zero meridian passes through point a. The pole of rotation of plate A relative to plate B is at 45°N , 0°E . The amplitude of the angular velocity vector is 10^{-10} radians per terrestrial year. The radius of Ares is 3400 km.

- What is the nature of the plate boundary between plates A and B?
- State where magnetic lineations might be found and sketch the pattern that would be observed.
- Calculate the relative velocity between plates A and B at locations a, b, c and d.
- Discuss the possible existence of such a two-plate planet.
- Discuss briefly how the stability or instability of a two-plate tectonic system depends upon the pole position and/or relative size of the two plates.

