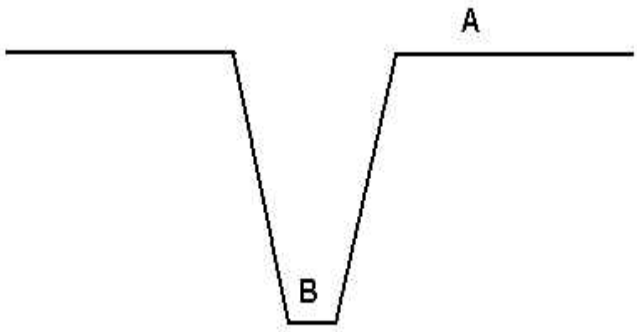
Geophysics – second “midterm”, fall 1999. Who?_____

1. In the diagram below, simple Bouguer anomalies are calculated on the ground at stations A and B; consider the topography. Which of the following statements is correct:

a) the value calculated at A is too low while that at B is too high.
b) both values would be too high;
c) both values would be too low
d) both values are just fine




**Now, explain and justify your answer:**

2. Consider the diagram below; each layer is 25 meters thick. What must the angle of incidence of a seismic ray be on the 1-2 interface to cause a critically refracted wave on the 3-4 interface? Sketch your rays.

shot
x
$V_1$ = 500 m/sec

$V_2$ = 2000 m/sec

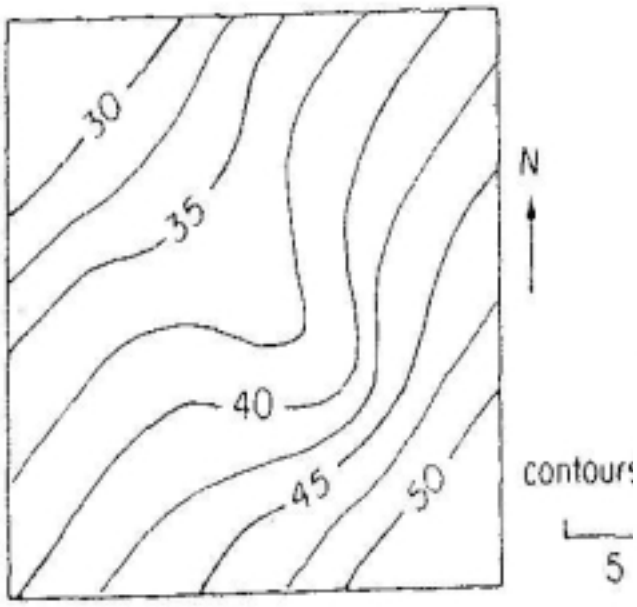
$V_3$ =1400 m/sec

$V_4$ = 5000 m/sec

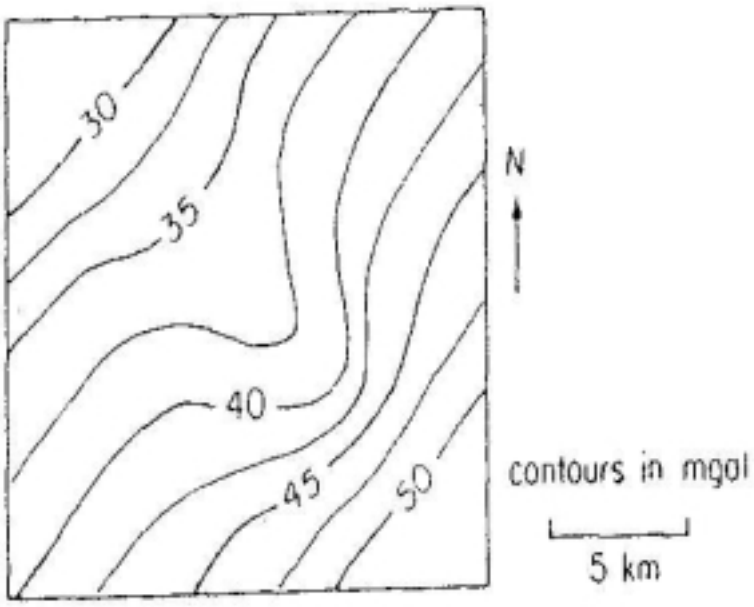
3. Examine the complete Bouguer anomaly map shown below. Assume the regional variation is caused by lateral density changes at depth.

a. Draw contours for the regional on the left map and the residual on the right hand map; use a 2.5 mgal contour interval. **Neatness and accuracy count here**.

Contour the regional:



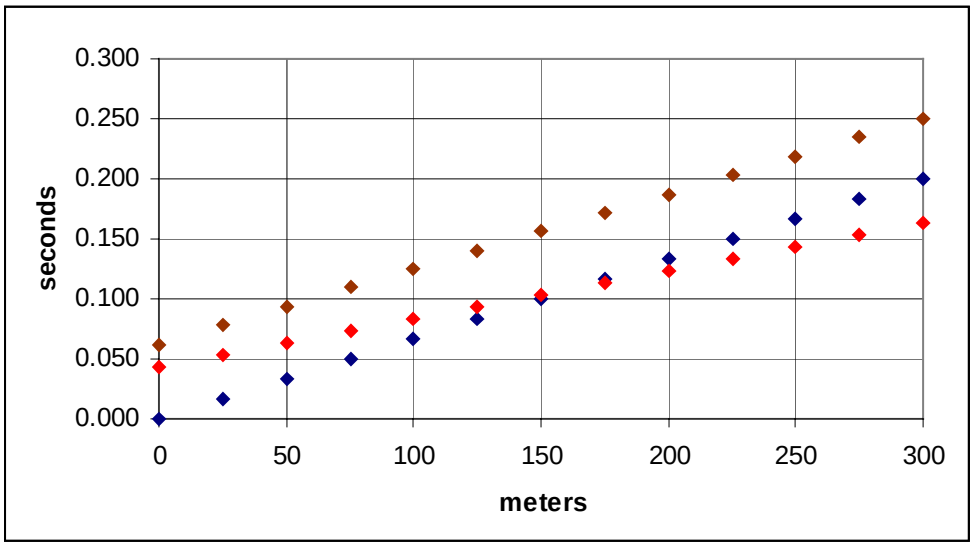

Contour the residual:




b. Which explanation of the local Bouguer anomaly is most probable? Sedimentary rocks of density 2,500 kg/m$^3$ are intruded by (1) rock salt with density 2,200 kg/m$^3$ or (2) granite with a density of 2,750 kg/m$^3$. Explain and justify your thinking.

c. In which direction is the density increasing at depth?

4. Mark and identify the 3 obvious phases on the T-x plot below.




Assume these seismic refraction data are perfectly symmetrical if you reverse the seismic line:

a. Interpret the data as best you can (velocities, thicknesses, material types)

b. Do such symmetrical data tell you anything conclusive about dip? If so, what?

c. Suppose the reversed data were not symmetrical – what might the problem(s) be?

5. Provide accurate, concise, geophysically relevant definitions and/or explanations for the following terms:

a. Principal compressive stress

b. Deviatoric stress

c. Anderson's theory of faulting

d. Seismic gap

e. Tidal friction

f. Gauss' theorem