STRUCTURAL GEOLOGY

Mid-Term Exam Questions

11th April 2017

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1. Use stereographic projections to answer the following questions.
a) Plot the following planes as great circles (β diagram) 18/17NW, 115/84NE and 128/72SW.
b) Horizontal bedding has been cut by cieavage at 33/64NW. Find the trend and plunge of the intersection lineation.
b) Plot the lines 18/62NW, 67/46SW, 122/0, vertical line and 112/12SE.

2. Provide text and diagrams to the following questions
a) Draw a 3D diagram of a fold showing anticline/antiform, syncline/synform, fold/hinge axis, fold limbs, fold axial plane.
b) Explain pure shear and simple shear with the help of diagrams
c) What are the factors that control ductile versus brittle behaviour of the rocks, and how do they affect ductile versus brittle behaviour?
d) What is a Flinn diagram?
e) What are the crenulation cleavage and axial planar cleavage.
f) What are the tension fractures and how are they formed?

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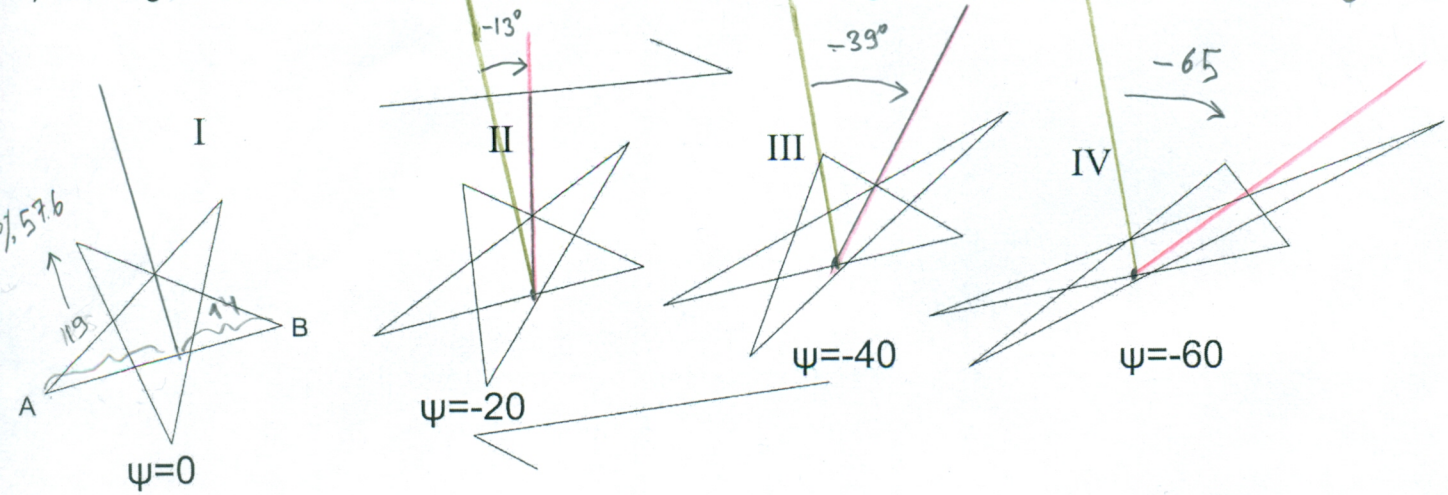
3) The star shown below is deformed by simple shear with shear strain values shown.
a) Calculate the longitudinal and angular changes along the line AB, and show them on e-γ and γ-γ diagrams.
b) Looking at the diagram you produced, what would be the e and γ values for an applies shear strain of ψ=54.5°.
c) What are the **incremental** longitudinal strains along the line AB between stages II and III?
d) Assuming that the line AB is deformed in 2 minutes between the stages II and III, calculate the strain rate.



Bonus questions:
1. What is the most common element in the Earth's crust?
2. What are the minerals in a granite?
3. What is the main rock type in the İTÜ Maslak campus?
4. How deep is the Bosphorus?

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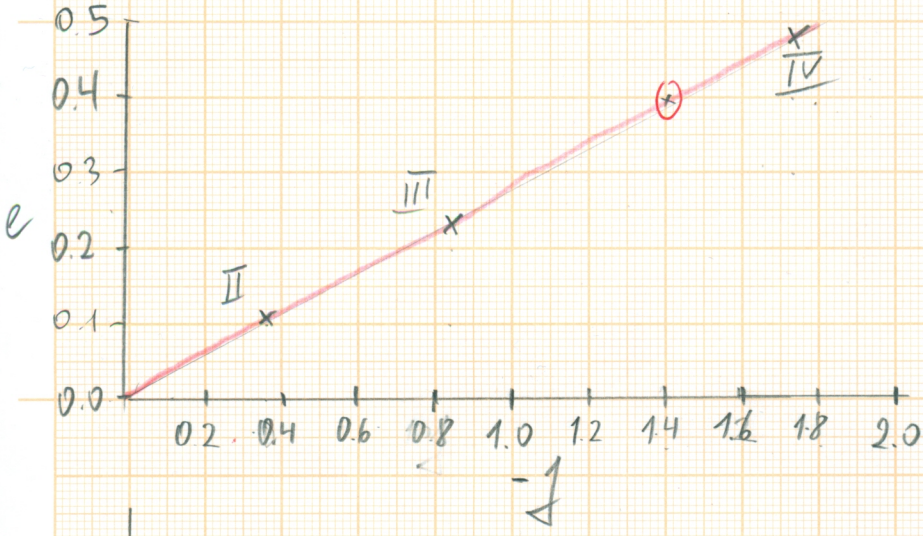
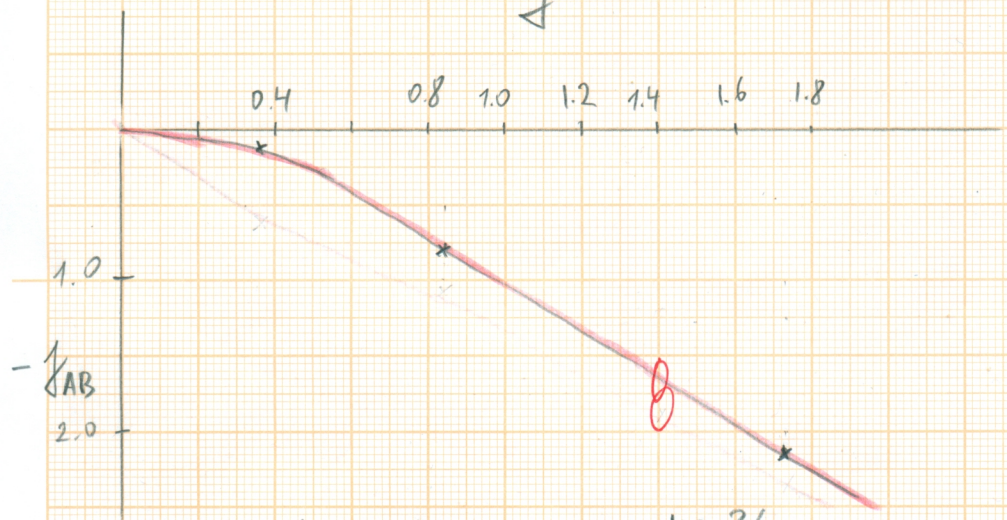
a)

	$\frac{1}{\lambda}$	AB	e	γ_{AB}	$\frac{1}{\lambda_{AB}}$
$\psi = 0$	0	325	0	0	
$\psi = -20°$	-0.36	36	0.11	-13	-0.23
$\psi = -40°$	-0.84	40	0.23	-39	-0.81
$\psi = -60$	1.73	48	0.48	-65	-2.14





b) $\psi = 54.5$

$\frac{1}{\lambda} = 1.40$

$e = 0.39$

$\frac{1}{\lambda_{AB}} = 1.65$

c) incremental strain $e = \frac{40-36}{36} = 0.111$

d) $\dot{\epsilon} = \frac{0.111}{120}\ s^{-1} = 9.25 \times 10^{-4}\ s^{-1}$

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question 1