STRUCTURAL GEOLOGY

Mid-Term Exam Questions

7th April 2015

1. Using stereographic projections

a) The measurements of strike and dip around a fold are: 148/62NE, 25/14SE, 154/58NE, 21/12SE and 20/16SNE. Find out the trend and plunge of the fold axis.

b) Bedding at 90/90 has been cut by cleavage at 133/04SW. Find the trend and plunge of the intersection lineation.

b) Pass a plane through the lines 118/62SE and 12/12NW. Find out the strike and dip of this plane.

2. Provide text and diagrams to the following questions:

a) What is the relation between cleavage plane, mineral streching lineation and the axes of the finite strain ellipsoid. Explain your answer with the help of a diagram.

b) Draw a diagram of a fold showing fold/hinge axis, fold limbs, anticline/antiform, syncline/synform and fold axial plane.

c) What are the factors that control the ductile versus brittle behaviour of the rocks?

d) Explain pure shear and simple shear with the help of diagrams.

e) What are the differences between similar and parallel folds. Explain with the help of diagrams.

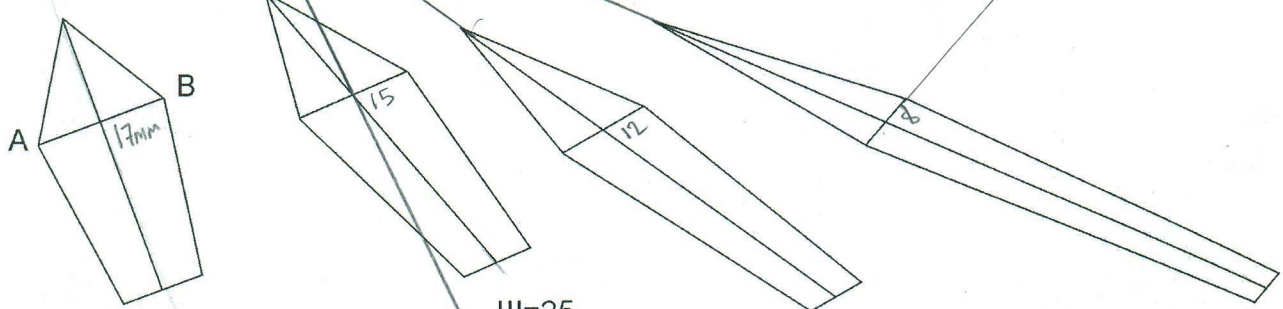
3. The diagram below shows undeformed and deformed pentagons.

a) Calculate the longitudinal changes along the lines AB. Show them on a γ versus e diagram.

b) Calculate the angular changes along AB and show them on a γ versus γ diagram.

c) Calculate the incremental extension along AB between stages ψ=25° and ψ=45°.

d) If the deformation between stages ψ=45° and ψ=62° occurs in three minutes, calculate the strain rate along AB..



Ψ=0

$J = 0$

$\psi_{AB} = 0$

$J_{AB} = 0$

Ψ=25

$J = 0.47$

$\psi_{AB} = 17$

$J_{AB} = 0.306$

Ψ=45

$J = 1.00$

$\psi_{AB} = 23$

$\gamma_{AB} = 0.424$

Ψ=62

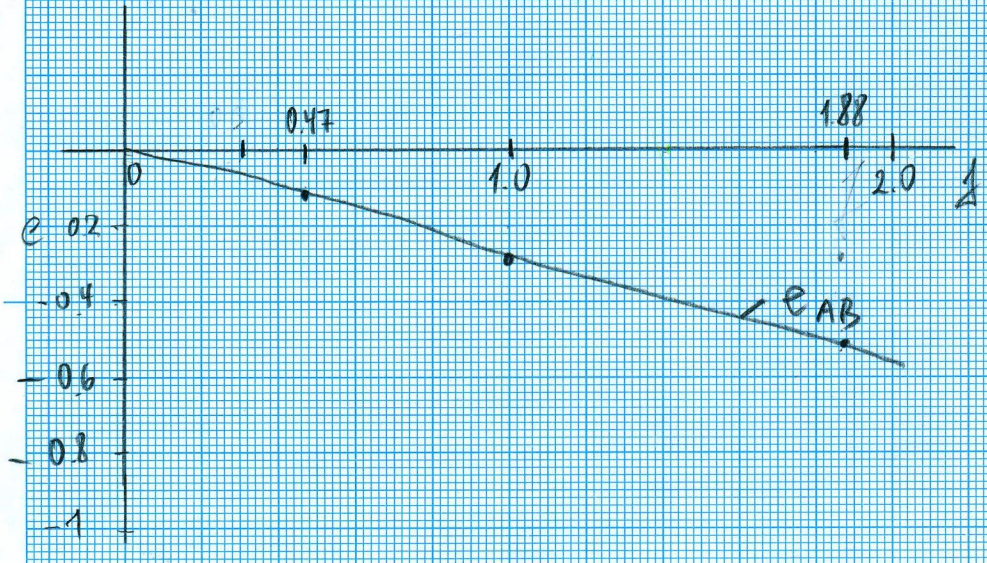
$J = 1.88$

$\psi_{AB} = 17°$

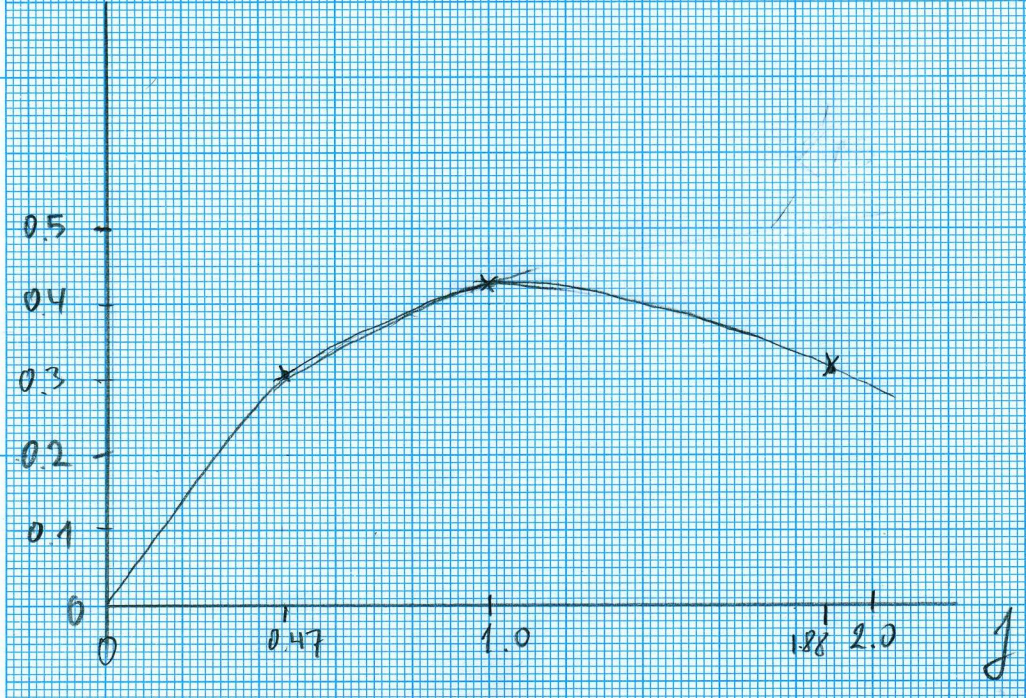
$J_{AB} = 0.306$

ψ	λ	$\overline{AB}$	e_{AB}	ψ_{AB}	λ_{AB}
0	0	17mm	0	0	0
25	0.47	15	-0.12	17	0.306
45	1.00	12	-0.29	23	0.424
62	1.88	8	-0.53	17	0306

a)

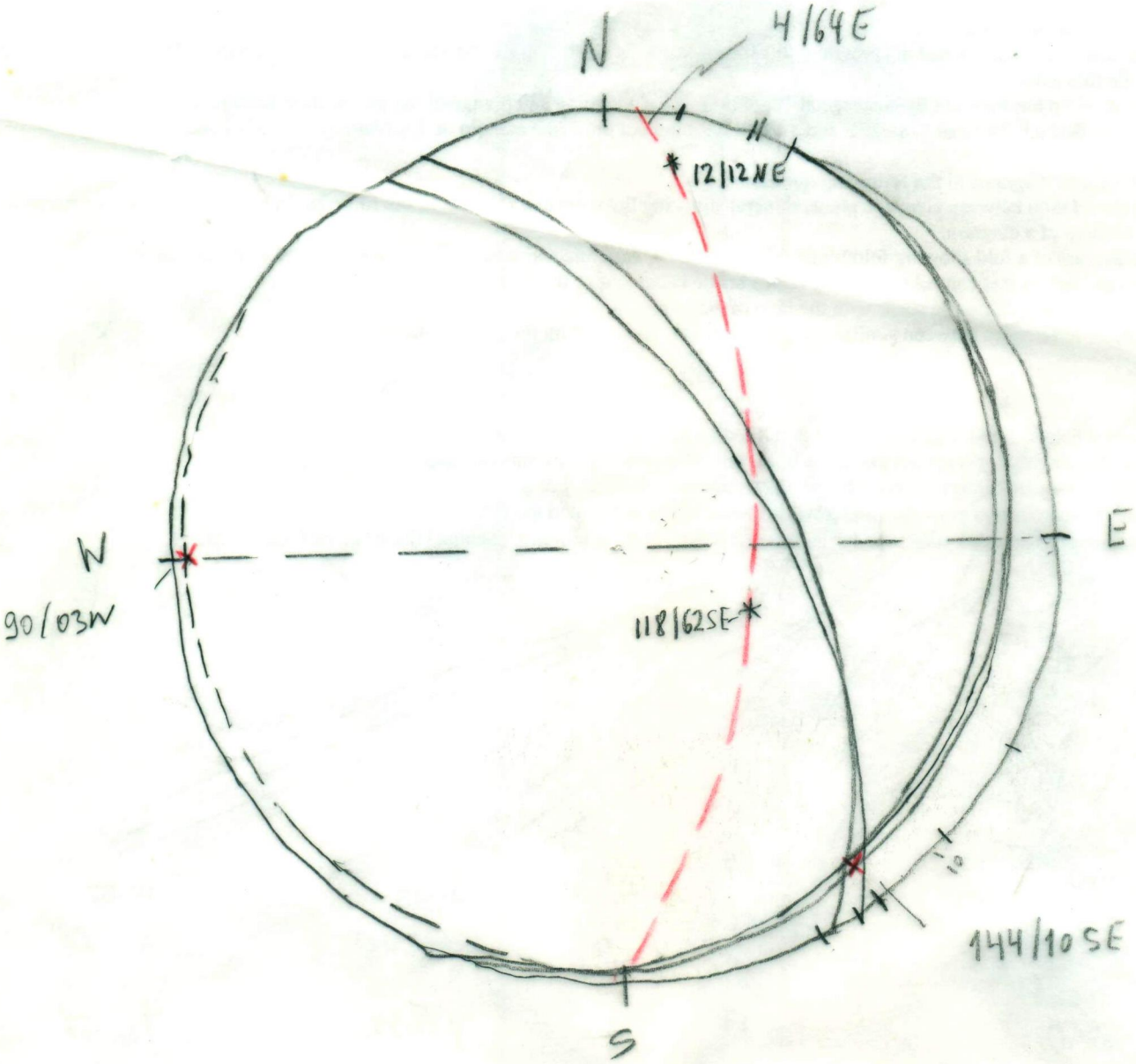


b)



c) $e_{incr.} = \frac{12-15}{15} = -0.2$

d) $e = \frac{8-12}{12} = -0.3\overline{3}$ $\quad \dot{\epsilon} = \frac{e}{t} = \frac{-0.33}{180} = -0.00183\ s^{-1} = 1.83 \times 10^{-3}$


N
4/64E
12/12NE
W
E
90/03W
118/62SE
144/10SE
S