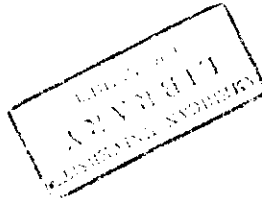


Name.....



Geology 213: Structural Geology Final Exam
Fall 1999/20

Exam rules apply
Time allowed: 2 hours

Section A (60 marks)

Note that three marks will be given for each correct answer and one mark will be deducted for each incorrect answer.

- 1) Which of the following structural events is not examined during kinematic analysis?
 - a) Translation
 - b) Rotation
 - c) Strain
 - d) Stress
 - e) Dilation

- 2) Which of the following features is a geometric element?
 - a) Fold limb
 - b) Fault plane
 - c) The axial surface of a fold
 - d) The hinge point
 - e) The hinge line

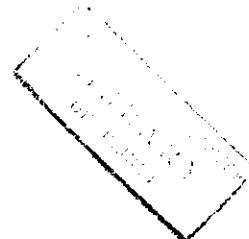
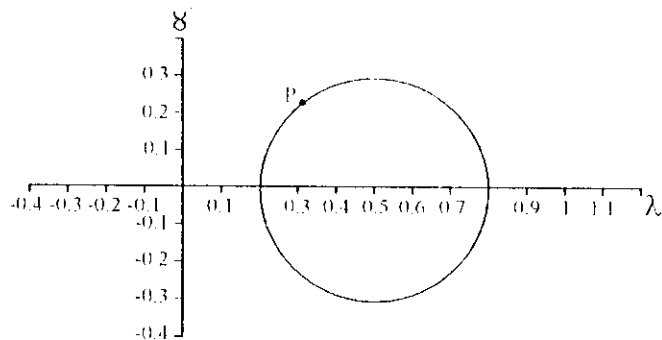


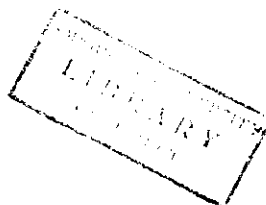
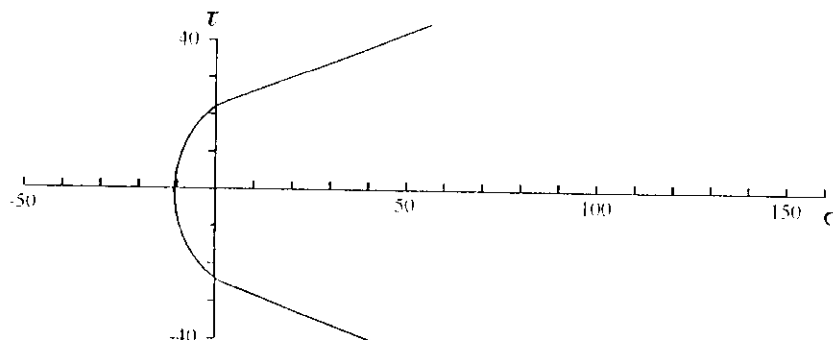
Figure 1.



- 3) On the Mohr diagram for strain shown in Figure 1 what are the values of S_1 , S_3 and the ψ value for point P?
 - a) $S_1 = 0.2$, $S_3 = 0.8$ and $\psi = 45$
 - b) $S_1 = 2.24$, $S_3 = 1.1$ and $\psi = 38$
 - c) $S_1 = 5$, $S_3 = 1.25$ and $\psi = 40$
 - d) $S_1 = 2.3$, $S_3 = 0.58$ and $\psi = 25$
 - e) $S_1 = 3.4$, $S_3 = 1.5$ and $\psi = 52$

- 4) What would be the values of γ and λ for a line oriented 35° to the maximum stretching direction in the strain regime depicted in figure 1?
 - a) $\gamma = 0.67$ and $\lambda = 2.3$
 - b) $\gamma = 0.3$ and $\lambda = 2.4$
 - c) $\gamma = 0.3$ and $\lambda = 0.4$
 - d) $\gamma = 0.9$ and $\lambda = 0.4$
 - e) $\gamma = 0.5$ and $\lambda = 2.7$

Figure 2.

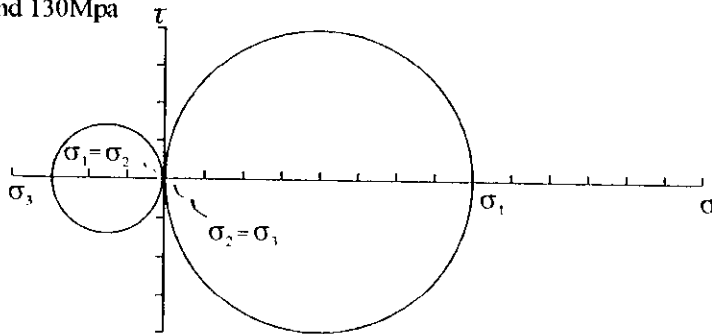


Name.....

Figure 2 is a Mohr failure envelope for the AUB limestone, examine the diagram carefully before answering questions 5-6.

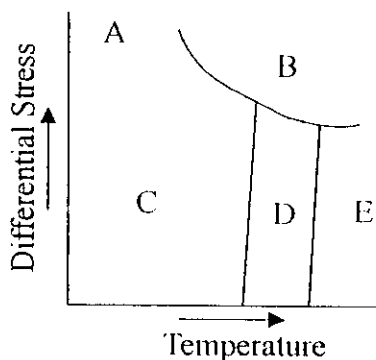
- 5) The tensile strength, cohesive strength and angle of internal friction are?
- $\tau_0 = -10, \sigma_0 = 22, \phi = 40$
 - $\tau_0 = -10, \sigma_0 = 24, \phi = 20$
 - $\tau_0 = 22, \sigma_0 = -10, \phi = 30$
 - $\tau_0 = 22, \sigma_0 = -10, \phi = 40$
 - $\tau_0 = -20, \sigma_0 = 20, \phi = 30$
- 6) If a specimen of the same limestone were to be subjected to 10Mpa then what would be the maximum and minimum pressures required to initiate failure?
- 5Mpa and 40Mpa
 - 5Mpa and 50Mpa
 - 10Mpa and 90Mpa
 - 10Mpa and 110Mpa
 - 10Mpa and 130Mpa

Figure 3



- 7) The shape of the stress ellipse represented by the Mohr stress diagram in Figure 3 would be:
- A perfect circle
 - A prolate ellipsoid
 - An oblate spheroid
 - An oblate ellipsoid
 - Like a needle
- 8) Which of the following formulas is not a measure of elastic behavior?
- $E = \sigma/\epsilon$
 - $\nu = \epsilon_{\perp} / \epsilon_{\parallel}$
 - $G = \tau/\gamma$
 - $K = \Delta \sigma / \Delta V$
 - $\sigma_d = \eta \dot{\epsilon}$
- 9) Screw dislocations are oriented:
- Perpendicular to the direction of slip
 - Parallel to the direction of slip
 - Obliquely to the slip direction
 - Either perpendicular or parallel to the direction of slip
 - Either parallel or oblique to the direction of slip

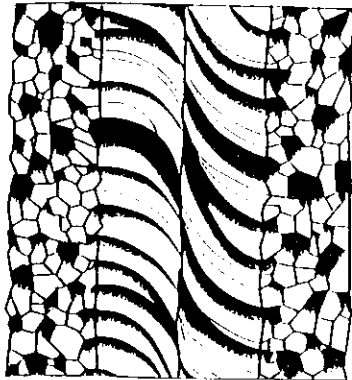
Figure 4



Name.....

- 10) Figure 4 is a simplified deformation map. Which of the areas marked A-E represents volume-diffusion creep?
- A
 - B
 - C
 - D
 - E
- 11) Which of the following statements about joints is not correct?
- Ribs are an expression of tilt
 - Hackles are an expression of twist
 - The axis of twist is in the plane of the joint surface and perpendicular to the direction of propagation
 - Statements A and C are both incorrect
 - Statements A, B and C are all incorrect

Figure 5



- 12) Figure 5 shows a crystal fibre vein. Which of the following statements about the vein is incorrect?
- The vein is syntaxial because it lacks a median line
 - The vein is syntaxial because the fibres grow in optical continuity with the wall rocks
 - The oldest increment of strain is represented by the fibres in the centre of the vein
 - The fibres grew parallel to S_1 in a noncoaxial deformation field
 - Statements B and D are both incorrect
- 13) If an anisotropic rock with a pre-existing foliation oriented parallel to σ_1 is faulted then the subsequent fault will form at what angle to σ_1 ?
- 10-20°
 - 30°
 - 25-45°
 - 65°
 - 80°
- 14) What is a fenster?
- An isolated section of allochthonous rocks
 - An isolated section of autochthonous rocks
 - A window through the allochthonous rocks to see the underlying autochthonous rocks
 - A window through the autochthonous rocks to see the underlying allochthonous rocks
 - None of the above
- 15) What factors determine the buckling of a single layer?
- The thickness of the stiff layer
 - The coefficient of viscosity of the stiff layer and the confining medium
 - The layer parallel strain
 - All of the above
 - Only a and b are required

Name.....

- 16) Cusate-Lobate folds form when:
- a) The viscosity ratio is low and there is equality between the thickness of the competent and incompetent layers
 - b) The viscosity ratio is high and there is equality between the thickness of the competent and incompetent layers
 - c) The viscosity ratio is low and there is inequality between the thickness of the competent and incompetent layers with the former being much greater.
 - d) The viscosity ratio is high and there is inequality between the thickness of the competent and incompetent layers with the former being much greater
 - e) The viscosity ratio is high and there is inequality between the thickness of the competent and incompetent layers with the former being slightly greater
- 17) Which of the following is not a linear structure?
- a) Rodding
 - b) Pencil structure
 - c) Boudinage
 - d) Mineral Lineation
 - e) Mullion
- 18) Passive folds are generally:
- a) Class 1a
 - b) Class 1c
 - c) Class 2 or 3
 - d) A and C are correct
 - e) B and C are correct
- 19) Which of the following will not determine whether or not an inclusion will rotate within a shear zone?
- a) Shape of the inclusion
 - b) Rigidity of the inclusion
 - c) Orientation of the inclusion with respect to the imposed strain
 - d) Proximity of the inclusion to the shear zone wall
 - e) Type of strain
- 20) δ objects are porphyroclasts that are:
- a) Strongly asymmetric
 - b) Stair stepping
 - c) Recrystallized slowly and protected by the crystal
 - d) Recrystallized fast relative to the strain rate
 - e) Have no wings

Name.....

Answer Sheet

Section A

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E
21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E
26	A	B	C	D	E
27	A	B	C	D	E
28	A	B	C	D	E
29	A	B	C	D	E
30	A	B	C	D	E

Name.....

Section B (40 marks)

Using labeled diagrams, and where possible geological examples, explain what is meant by the following terms (Remember: No diagram = no grade).

1) Out of sequence thrust

2) Failure envelopes

3) Line defects

4) Flinn plot

5) Riedel shears

Name.....

6) Boudinage

7) Formation of kink folds

8) Tectonites

9) Types of cleavage

10) C and S fabrics.