

Geology 3063

Exam 3

December 3, 1999

Instructions.

1. Place all books and notes on the floor.
2. Read each question carefully, then read it again.
3. **ThinkThinkThinkThinkThink.**
4. Organize your thoughts and outline your answer mentally before writing. If you are not certain, put your ideas down on the back of the page before proceeding.
5. Answer the questions in the space provided. You may use the backs of the pages to outline and doodle.
6. You have 60 minutes. All exams must be turned in by 10:00am. You are responsible for pacing yourself.
7. Proceed when ready.

This too shall pass

- 20 points 1. Assume that you have a rock volume that is composed of interlayered limestone and dolomite. All of the layers are 1.0 meter thick, and the dolomite layers occur on a 5 meter spacing. Describe how this rock volume would behave, what deformation mechanisms would be active, and the resultant structures and rock fabrics that would develop under the following conditions. Assume that water is present, and that the system is subject to pure shear.
- a) The rock volume is subjected to an imposed strain rate of 1×10^{-4} at a temperature of 25°C and at a depth of 1.5km.
 - b) The rock volume is subjected to an imposed strain rate of 1×10^{-8} at a temperature of 300°C and at a depth of 10km.

20 points 2. Compare and contrast the deformation history and conditions of the two samples at the front of the room.

- 20 points 3. Explain, from the crystalline viewpoint, what is happening within a material that experiences the following $\sigma - \epsilon$ curve. You may want to label and describe important “points” and “regions” along the curve, and include a description of their significance in your answer.

20 points 4. Compare and contrast the three primary failure criteria, discussing their basis, and use in structural geology.

20 points 5. What type of deformation does the following deformation tensor describe?

$$\begin{pmatrix} 1 & \frac{1}{4} \\ 0 & 1 \end{pmatrix}$$