

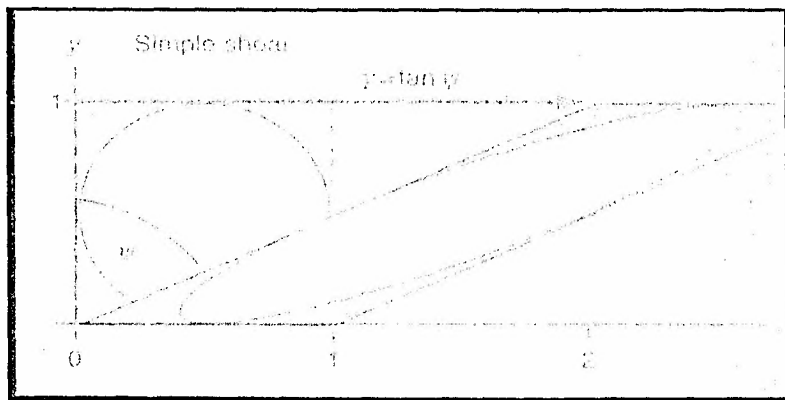
*Shattuck*  
20.09.18

**ES3101: Advanced Structural Geology**  
**Midsem Exam**  
**Full Marks: 25**  
**20th Sept, 2018**

**Name :**  
**ID#**

**Please provide precise and succinct answers to the questions. Please also provide sketches, wherever possible, to share your thoughts with me. Good luck!**

1. TRUE or FALSE. Please justify your answers with sketches/succinct arguments. (8)
  - (a) The larger the angular discordance in an angular unconformity the greater is the missing time.
  - (b) Estimating the orientation of maximum principal strain axis from an  $R_f$ - $\phi$  plot is not possible.
  - (c) For equal contribution of pure and simple-shear, the kinematic vorticity number ( $W_k$ ) = 0.5
  - (d) A horizontal Sill and a vertical Dike indicate similar orientations of  $\sigma_1$
2. If material lines can not rotate from lengthening to shortening field during progressive deformation, then how can you explain the occurrence of folded boudins in deformed rocks? (2)
3. Please write a deformation matrix for the following deformation. Is it possible to arrive at the same finite deformed state from a pure shear stress? Based on this thought experiment, what would you conclude? (2+1+2)



4. Please write the relationships among the three principal stress axes for a pure-shear stress. Draw the corresponding Mohr circle. What is the value of normal stress on the planes of highest shear stress? Please also write the corresponding 3X3 stress matrix. (0.5+1+0.5+1)

3. Assume the following plot is a Flinn Plot marking the quantified strain from different clasts of a conglomerate. Please mark the following on the plot.

- (a) Axes of the plot, (b) Constrictional strain field, (c) Flattening strain field, (d) simple shear, (e) pure Shear (2.5)
- Mark the relatively more competent clasts in this rock. (0.5)
- How would you interpret these data? (2)
- What are the limitations of this plot? (2)

