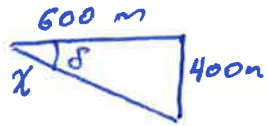
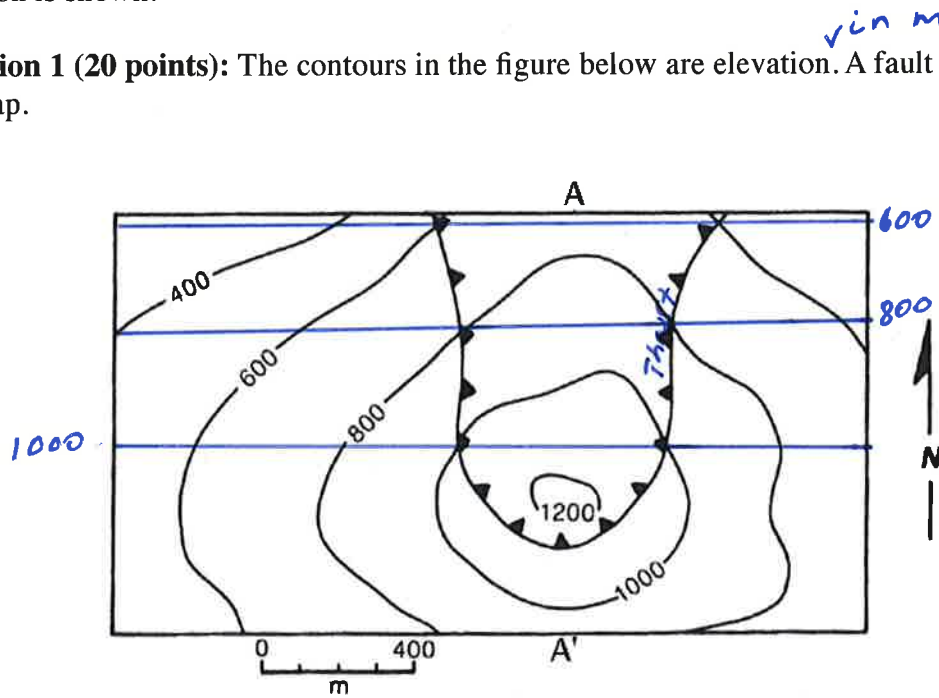


Student Name: *Nestor*

GEO210 Structural Geology
Midterm test
October 9, 2018

This test is closed book and closed notes. You have two hours to complete the test. Please be sure to show all your work. The total value of the test is 100 points. The point value of each question is shown.

Question 1 (20 points): The contours in the figure below are elevation. A fault is shown in the map.



$$\delta = \arctan\left(\frac{400}{600}\right)$$

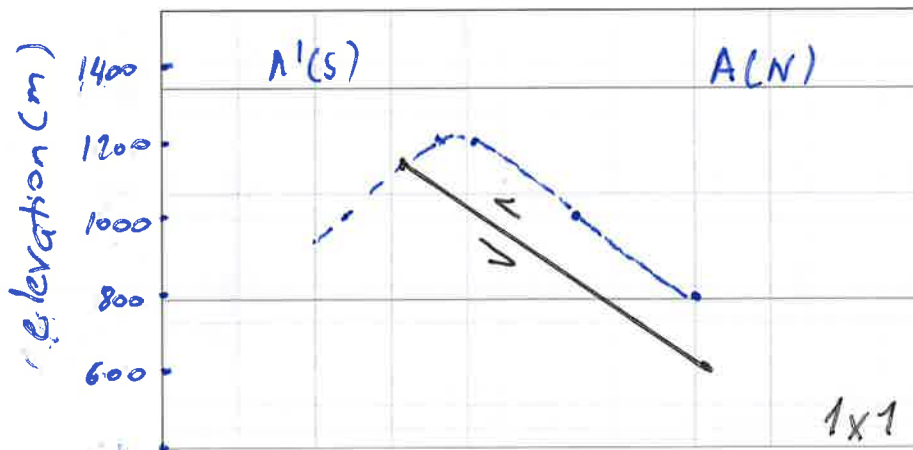
$$\delta = 34^\circ$$

(a) What is the attitude (strike and dip) of the fault plane?

270/34 (RHR)

090/34 N

(b) Draw a cross section along A-A' showing topography, the fault plane, and the sense of fault movement using arrows.



Student Name: Nestor

a) 60°

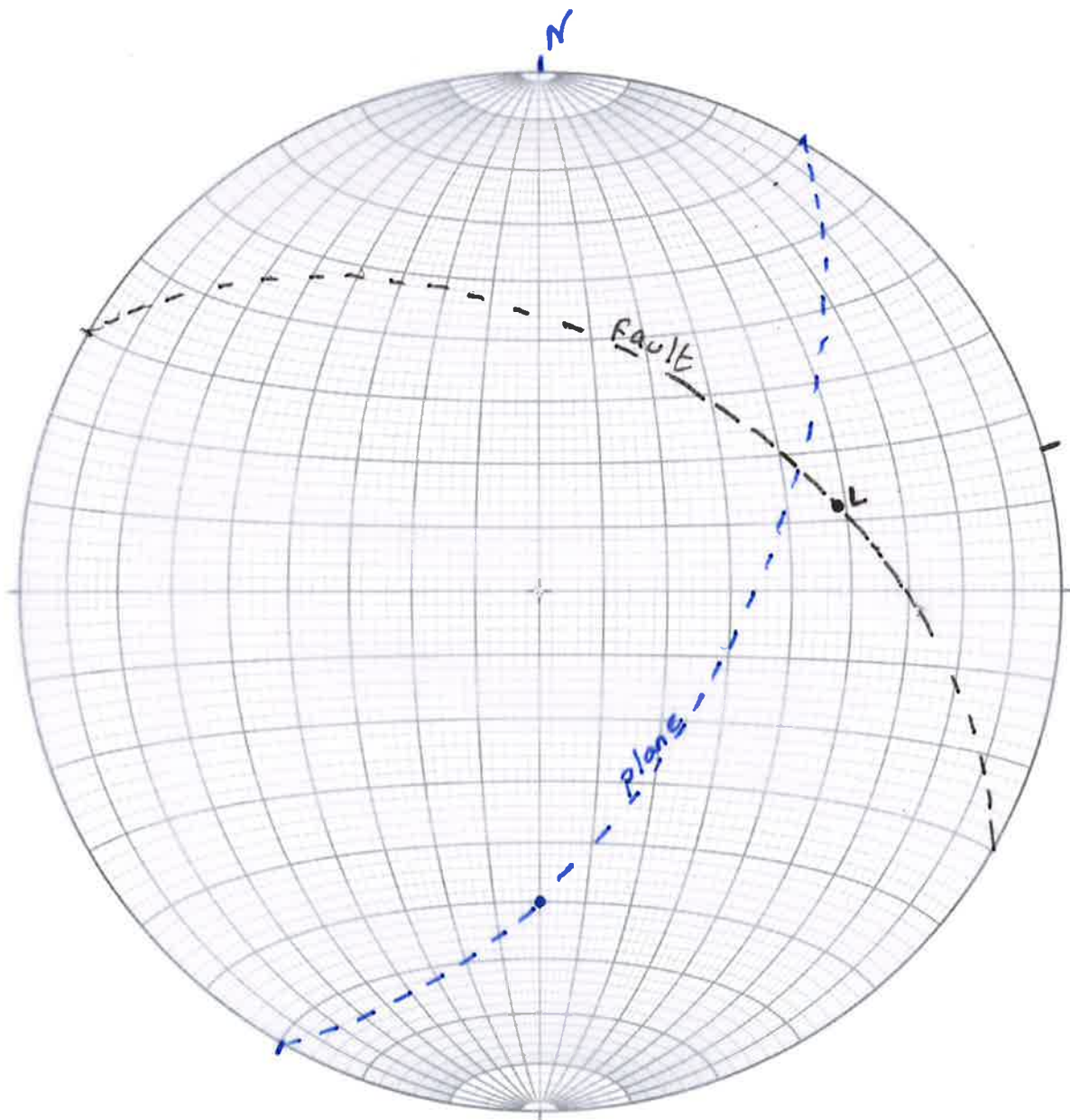
Question 2 (30 points): Solve the two problems below using the stereonet. Make sure to show your work in the transparent sheet provided in the test.

b) 40°

(a) Bedding strikes in a direction 210 and on a vertical N-S trending cross-section apparent dip of 40S. Find the angle of true dip.

Pole = 58° SE
pitch:

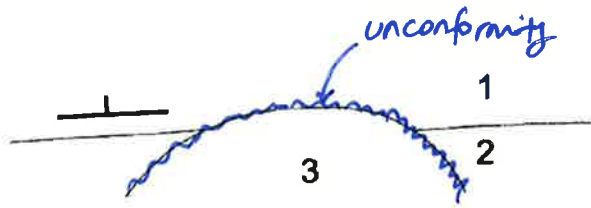
(b) Slickenside lineations trending 074 occur on a fault with orientation 300/50 (right hand rule). Determine the plunge of these lineations and their pitch in the plane of the fault.



Student Name: *Nestor*

Question 3 (10 points): For the two geologic maps below give the sequence of rock units in the order of deposition, oldest first.

(a)

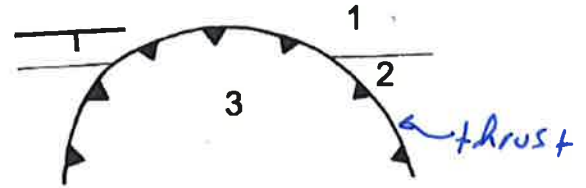


2 → oldest

1

3 → youngest

(b)

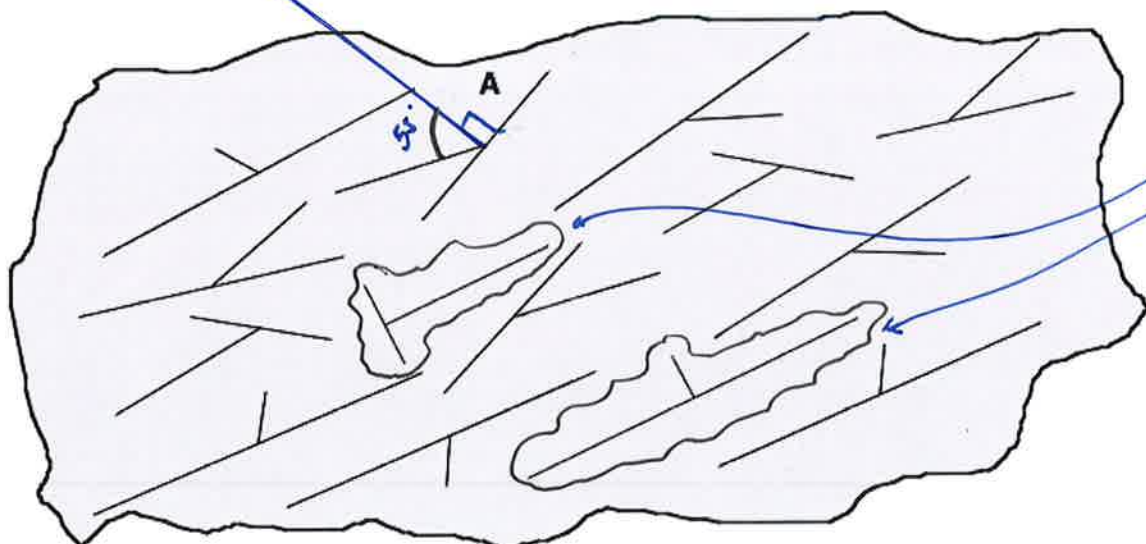


3 → oldest

1

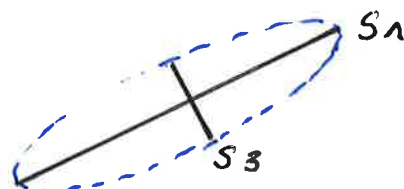
2 → youngest

Question 4 (20 points): The sketch below shows the traces of the medial line and the hinge line (originally at 90° to each other) of a group of brachiopods on a rock surface. All of the brachiopods were originally the same size.



2 Brachiopods with orthogonal medial & hinge lines

3



Student Name: Nestor

(a) Make a careful sketch showing the orientations of the principal axes of finite strain in the rock (Hint: Don't use the Wellman method. It will take too long. There are two brachiopods you can use to figure out the principal strain axes)

See page before

(b) Calculate the strain ratio S_1/S_3

$$S_1/S_3 = \frac{48 \text{ m/m}}{12 \text{ m/m}} = \underline{\underline{4}}$$

(c) Calculate the angular shear and shear strain that the brachiopod "A" has suffered

$$\psi_A = 55^\circ \quad \gamma_A = \tan(55^\circ) = 1.4$$

(d) Was the deformation produced by coaxial or non-coaxial strain? How can you tell?

We can't tell :

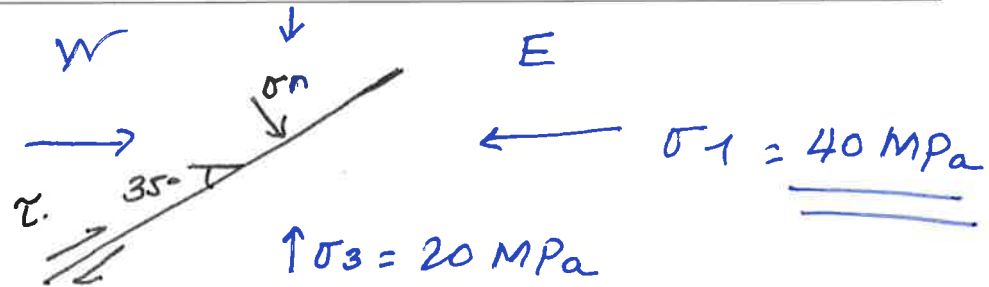
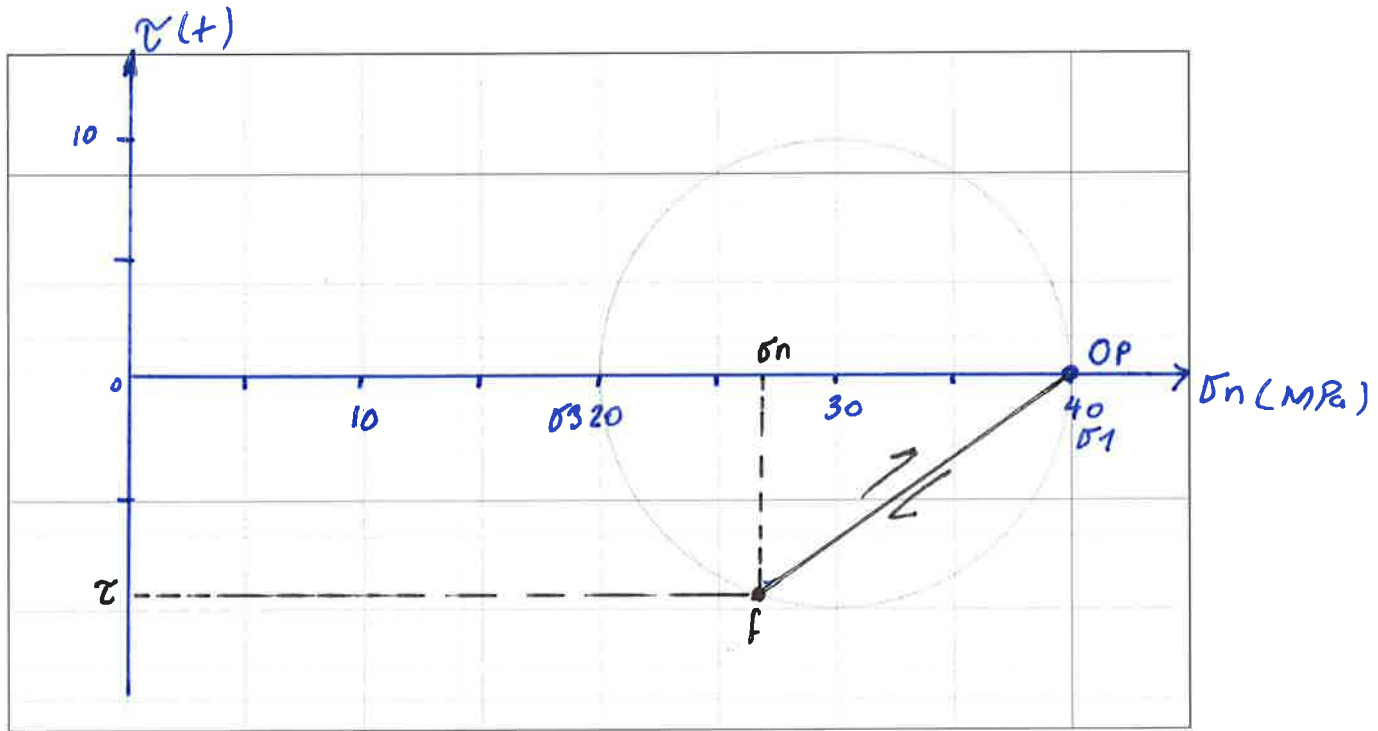
1. We don't have intermediate stages
2. We don't have initial stage

Student Name: *Nestor*

Question 5 (20 points): Use the Mohr Circle for stress to solve the following problem:

Suppose that σ_1 is horizontal, oriented east-west, and equal to 40 MPa, while σ_3 is vertical and equal to 20 MPa.

(a) Determine the normal and shear tractions on a fault striking north-south and dipping 35° west.



(b) Is the fault a normal or a reverse fault?

$$\sigma_n = 27 \text{ MPa}$$

$$\tau = -(8-9) \text{ MPa}$$

Reverse fault.