

**GEOL 3700 STRUCTURE AND TECTONICS  
LABORATORY EXERCISE 3**

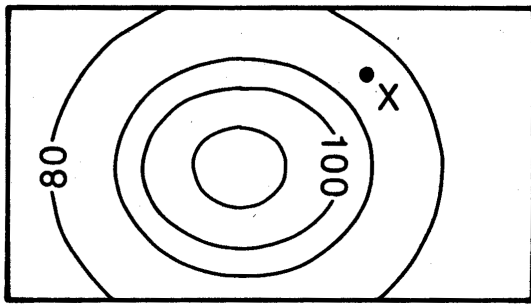
**Goals:**

1. Improve your map-reading and map-making skills.
2. Learn to generate and interpret structure contour maps.
3. Learn to generate and interpret isopach and isochore maps.
4. Become more proficient at drawing topographic profiles.

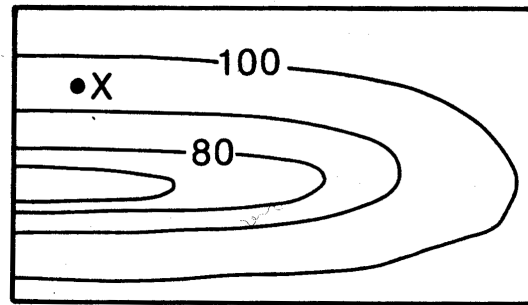
**Tasks:**

- a) Read and understand the handout on structure contour, isopach and isochore maps.
- b) Complete exercise 1, which involves interpreting simple structure contour maps.
- c) Complete exercise 2, in which you sketch a structure contour map of an unconformity. Look carefully at the provided data and envision the basement structure before drawing any contour lines.
- d) Complete exercise 3, which asks you to interpret drilling data from a salt dome. For some ideas about the style of deformation of bedding above a salt dome, see Figure 2-15 in the handout that you received with this lab. Making a structure contour map from the drill hole data in this exercise will present you with an exciting challenge.
- e) Complete exercise 4. This is a true 3-point problem, in which you are given the depth to a bed at three locations and you must determine the strike and dip of the bed from the data.
- f) Complete exercise 5. Be sure to draw your topographic profile very neatly. See Professor Bunds for hints on how to efficiently and accurately generate a topographic profile.

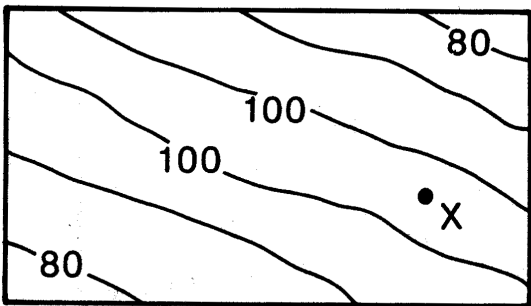
This lab is due at the beginning of the next lab period.



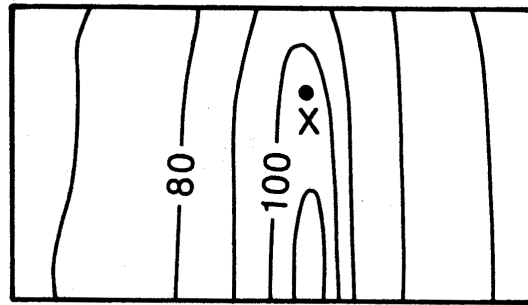
(a)



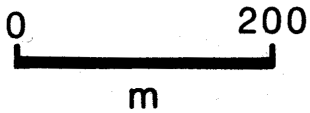
(b)



(c)



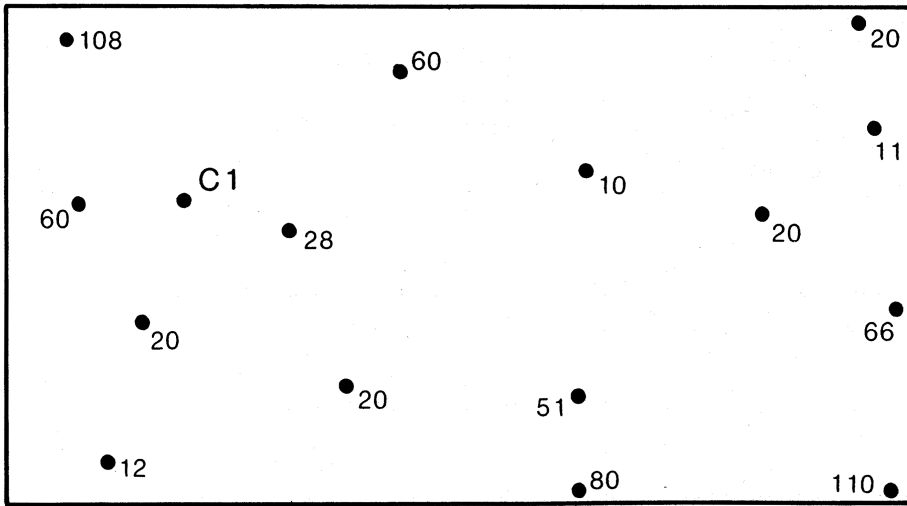
(d)



Contour Interval = 10m



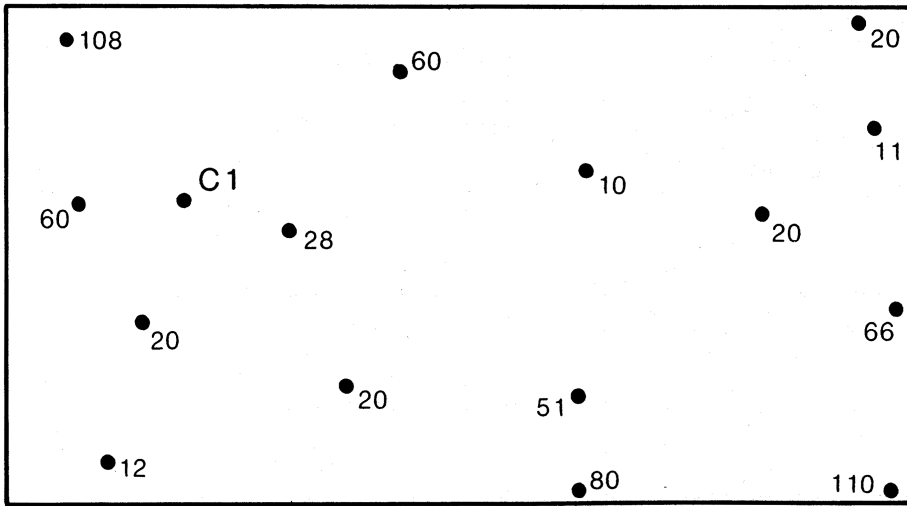
Exercise 1. The structure contour maps in the figure above represent 4 simple structures. The depths marked by the contours are meters below mean sealevel. Interpret each map and identify in writing and with the appropriate symbols on the maps the structure depicted in each. Draw a strike and dip symbol at each point marked with an X on the maps.



0 200  
meters

**Bloomer County**  
Contours on top of basement.  
Contour interval=20m.

**Figure 2-M6.** Point data on depths below horizontal ground surface of Precambrian/ Mesozoic contact in Bloomer County.

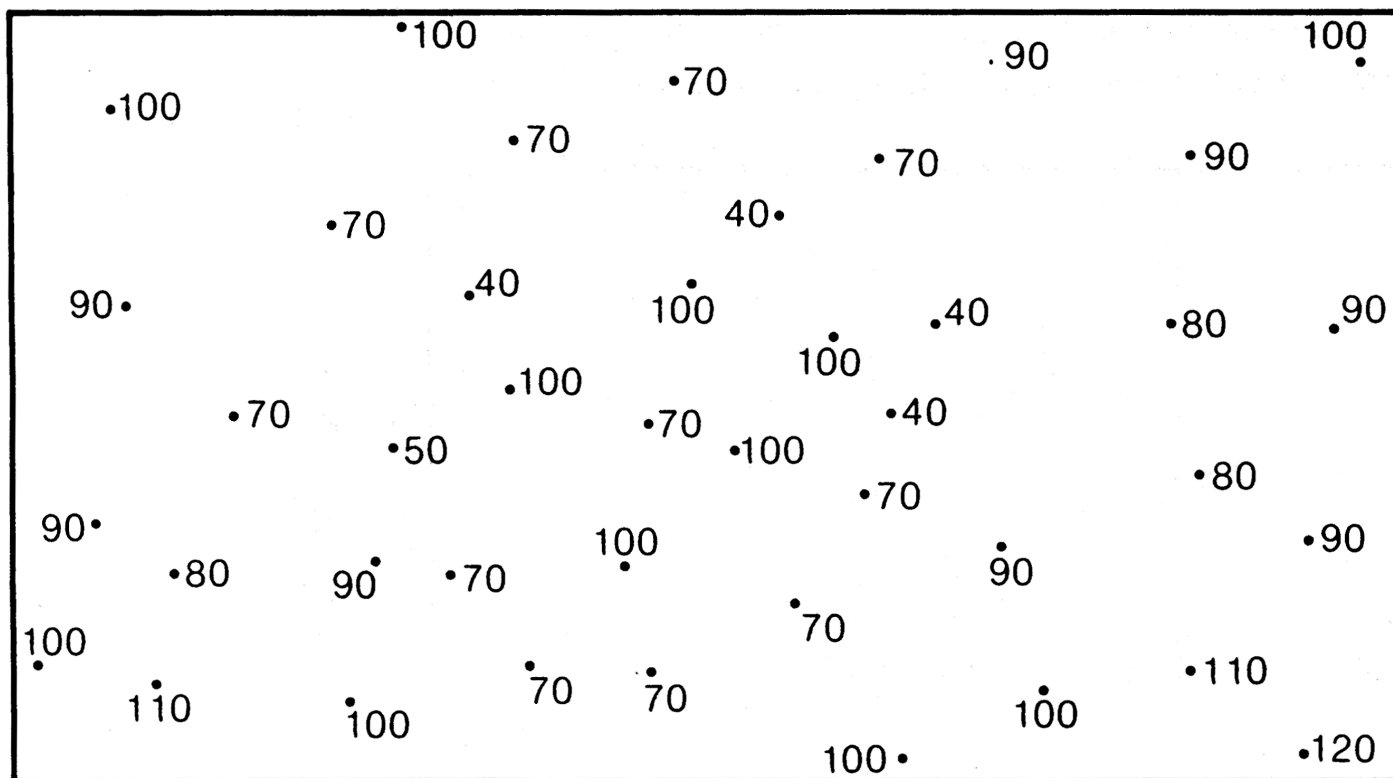


0 200  
meters

**Bloomer County**  
Contours on top of basement.  
Contour interval=20m.

**Figure 2-M6.** Point data on depths below horizontal ground surface of Precambrian/ Mesozoic contact in Bloomer County.

Exercise 2. On the map above, you are provided with the depth to an unconformity at a number of locations. Horizontal Mesozoic strata overlie crystalline basement at the unconformity. The depth to the unconformity is given in meters below sealevel at drill hole locations. Complete the following: 1) Interpret the drill hole data and depict your interpretation with a structure contour map. Use a 20 m contour interval. 2) What is the approximate attitude of the unconformity below C1? 3) At approximately what depth would a well drilled at C1 intersect the basement? 4) What sort of geologic feature does your structure contour map illustrate?

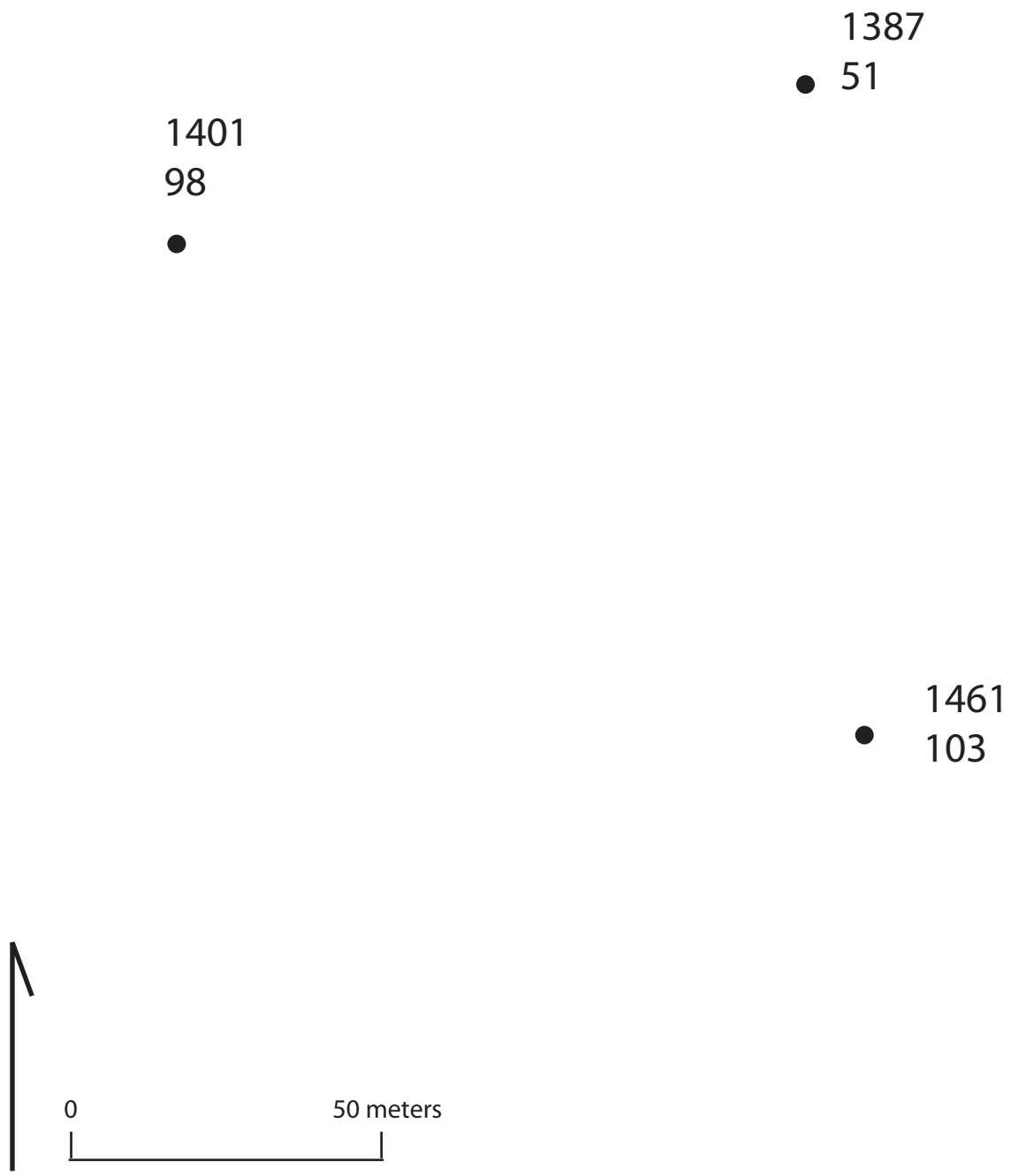


Drunk Gator Field

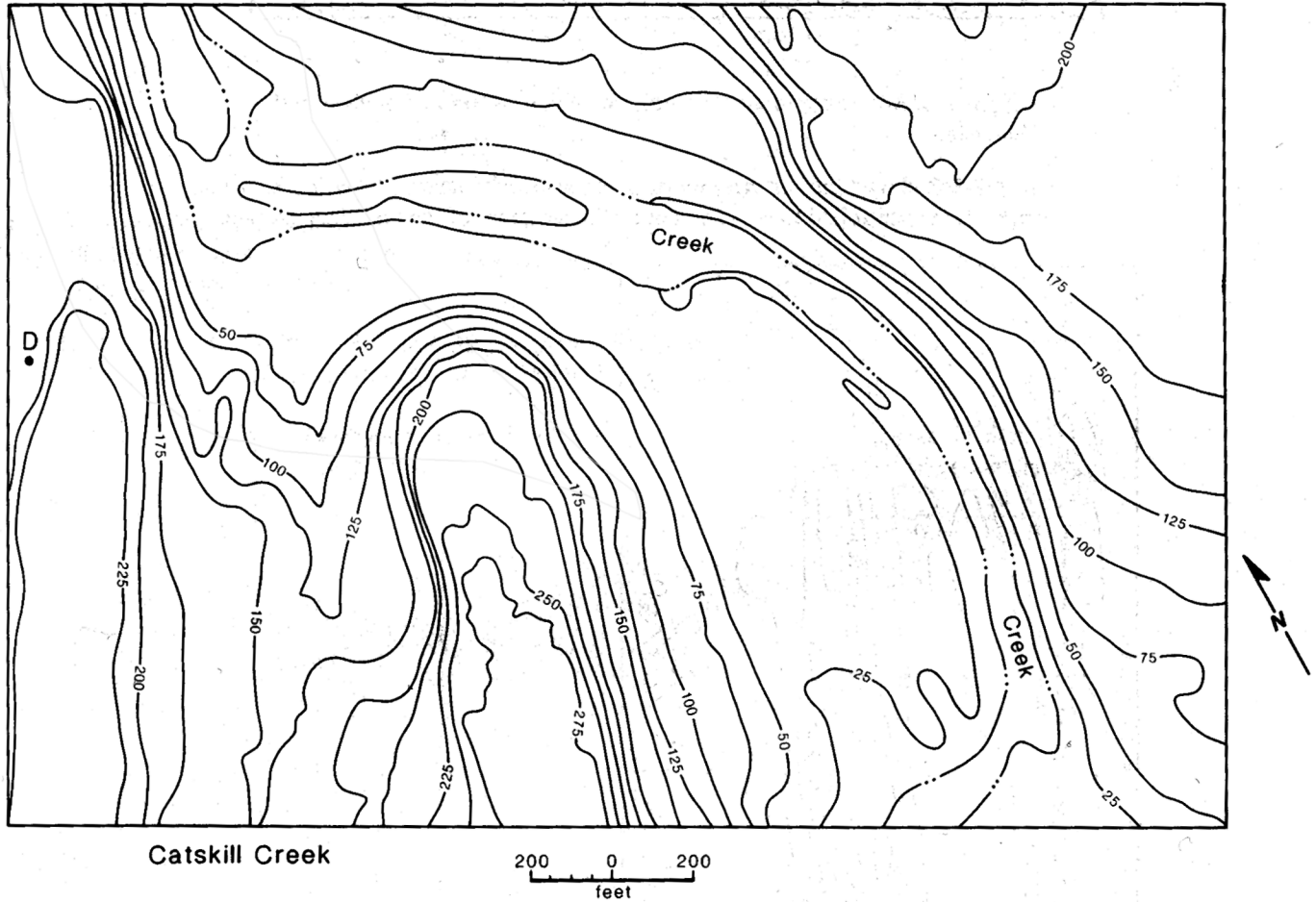
The map above shows depth in meters below mean sea level to the top of the Bayou Sandstone. Geologists with experience working in this area suspect that the Bayou Sandstone is underlain by a salt dome in the area covered by the map.



Exercise 3. The stratigraphers in your independent oil company are stymied and frustrated by the drill hole data shown in the map above. They need you to interpret the data and sketch a structure contour of the top of the Bayou Sandstone, which is a very productive oil reservoir unit throughout much of southeastern Texas. It is standard practice to use a 20 meter contour interval at your company. Your task will be eased if you recall that your old friend who had a lot of experience working in the area, Saul T. Faultenfield, said there are many salt domes in the region.



Exercise 4. The map above gives the following information for three drill holes: elevation of the ground surface and depth below the ground surface to the San Pellegrino Sandstone, which is an important aquifer in the region. Your task is to determine the strike and dip of the San Pellegrino Sandstone in the area, and to estimate its depth at a proposed well site (point A), which is at 1323 m elevation. Elevations are given as meters above mean sea level, and depths are given in meters.



Exercise 5

The map above shows topography across a creek in New York. Note that north is not straight up on this map - see the north arrow on the right side of the map. Complete the following.

- Draw a section line from point D across the map following a trend of  $S60^{\circ}E$ . Label the end of the line on the east side of the map D'.
- What is the contour interval of the map?
- What is the maximum relief crossed by section line D - D'?
- On a sheet of tracing paper construct a topographic profile with no vertical exaggeration along the line of section that you drew.
- What is the steepest slope crossed by your line of section? Express your answer in degrees and grade (gradient is the rise/run x 100%, which equals the tangent of the slope angle multiplied by 100%; note that the steepness of roads is commonly expressed as a grade).
- Sketch on the map the outcrop pattern of a bed that outcrops about 300 feet south of D, is about 75 feet thick, and is oriented  $090/45S$ .