

Closed Book Examination

Time Limit: 120 minutes

Total Points Available: 100

5 problems

Scores:

1. \_\_\_\_\_ /15

2. \_\_\_\_\_ /20

3. \_\_\_\_\_ /20

4. \_\_\_\_\_ /20

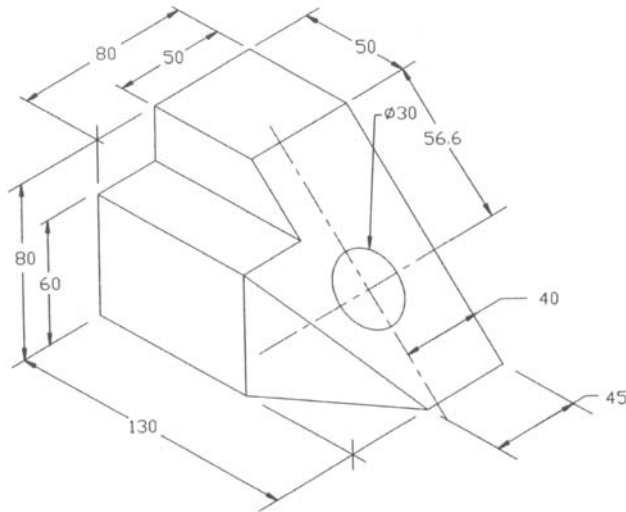
5. \_\_\_\_\_ /25

Total: \_\_\_\_\_

**Problem #1** (15 points)

The figure below shows a pictorial view of a part with a hole that goes completely through it. Using *first-angle projection*, sketch the front, top and right side views of this part in their proper relative locations, with the correct relative scales, alignments, and orientations. Add an auxiliary view (again, in its proper relative location, with the correct relative scale, alignment, and orientation) of the entire part to show the inclined surface with the hole in its true shape.

Your sketches do not need to be made exactly to scale, but some reasonably proper proportions will be expected. It is not necessary to include the dimension numbers in your sketches.



E 28, Midterm Examination #2, Fall 2006

Name \_\_\_\_\_

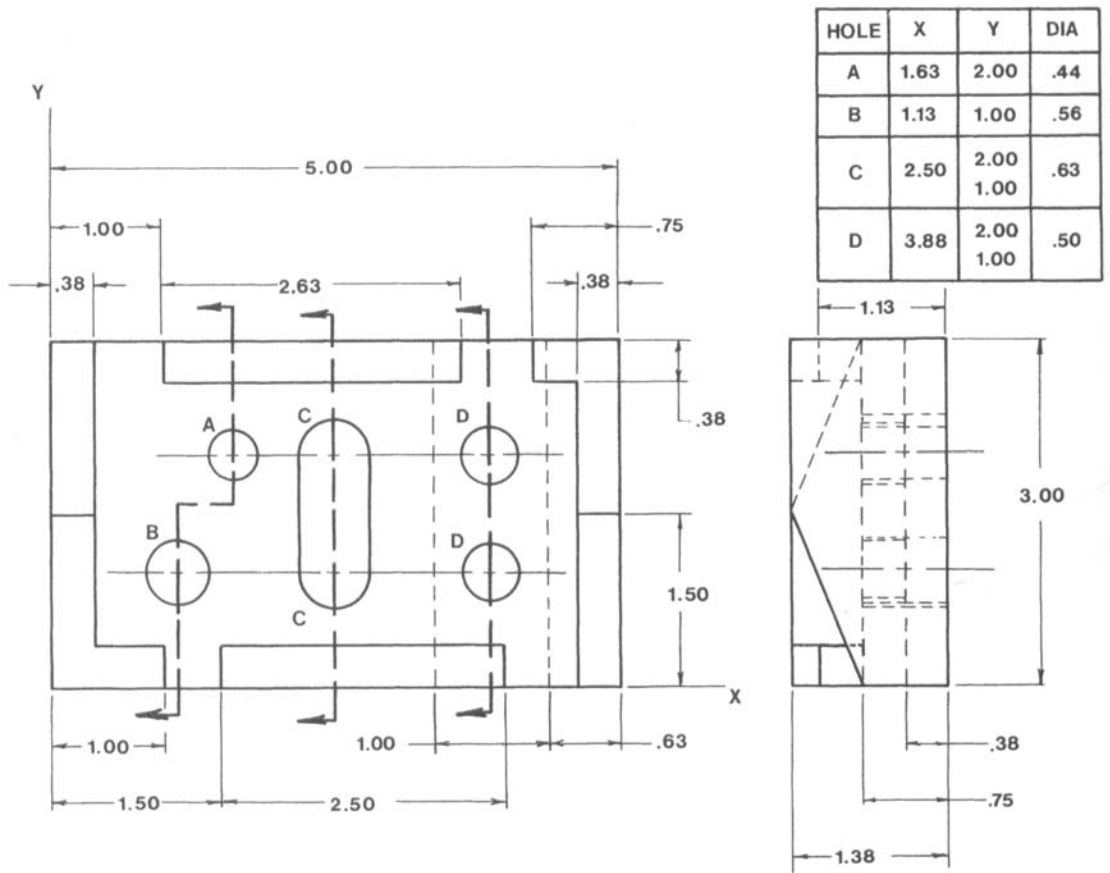
SID # \_\_\_\_\_

**Problem #2** (20 points)

The figure below shows the front and right side views (using third-angle projection) of a part.

- a) On the figure, add a top view in its proper relative location, with the correct relative scale, alignment, and orientation.
- b) On the next page, show the three section views that are created using the three section lines shown on the front view. Properly label the section lines and section views. Be sure to use a scale, alignment, and orientation that is consistent with the original figure.
- c) Sketch an (approximately) isometric pictorial that shows the remaining portion if the part had actually been cut with the offset section plane that goes through holes A and B. Crosshatch the newly exposed surfaces that were formerly inside the solid part.

Your sketches do not need to be made exactly to scale, but some reasonably proper proportions will be expected.



Name \_\_\_\_\_

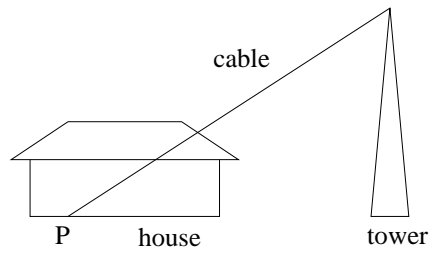
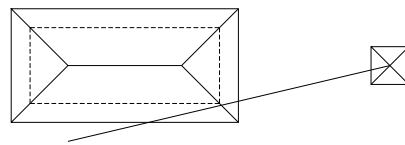
SID # \_\_\_\_\_

**Problem #3** (20 points)

The figure on the next page shows the front and horizontal views of a house and a radio antennae tower that the owner wishes to build next to it. There is a support cable that extends from the top of the tower to the ground. The cable intersects the ground at point P. You are asked to make the graphical constructions so that the following information can be determined from a direct measurement. Sketch as accurately as you can, with the instruments that you have, the necessary constructions you would make on the figure. The figure is purposely small so you can build any necessary viewing planes in any direction.

- a) What is the true length of the cable? Show where this quantity can be directly measured.
- b) What is the true angle of intersection between the cable and the ground? Show where this quantity can be directly measured.
- c) Will the cable intersect the roof of the house? If so, find the point of intersection. If not, find the minimum distance between the cable and the roof, and show where this quantity can be directly measured.

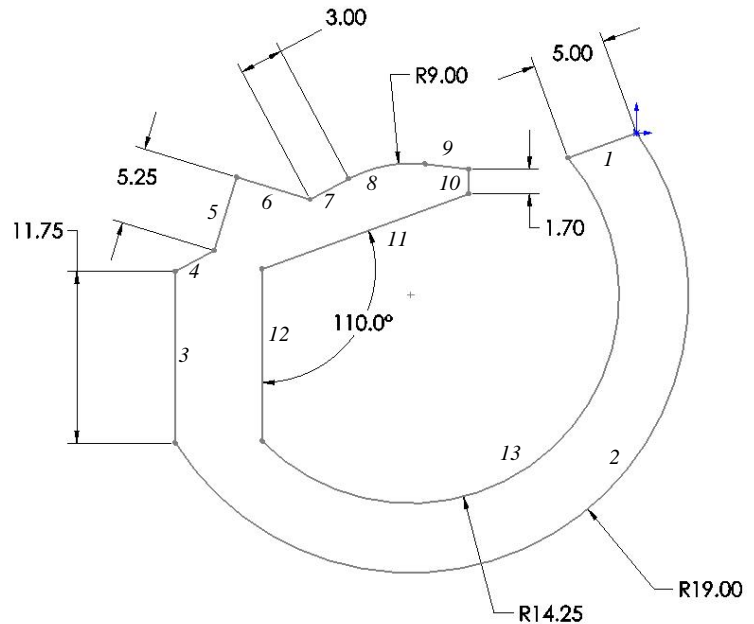
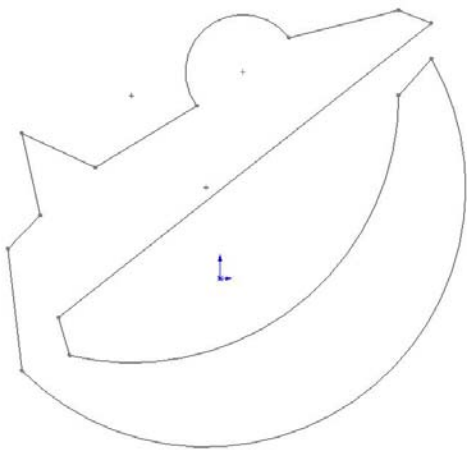
Since the instruments you have are of limited capability and accuracy, the technique you use will be more important than the actual answer you get. In the space below, describe the constructions you make to find the answers to the questions above.



**Problem #4** (12 points)

The figure below on the left is a closed loop sketch before the application of geometric and dimensional constraints. The figure on the right shows the same sketch after application of these constraints. All the necessary dimensions are shown. For each segment, specify the geometric constraints that have been applied to fully constrain the sketch. As examples, the constraints on segments 3 and 12 have been done for you.

Constraint types: Horizontal, Vertical, Concentric, Co-linear, Equal, Tangent, Parallel, Perpendicular, Coincident



Segment #      Constraints

1

2

3      *Vertical, equal length to 12*

4

5



**6**

**7**

**8**

**9**

**10**

**11**

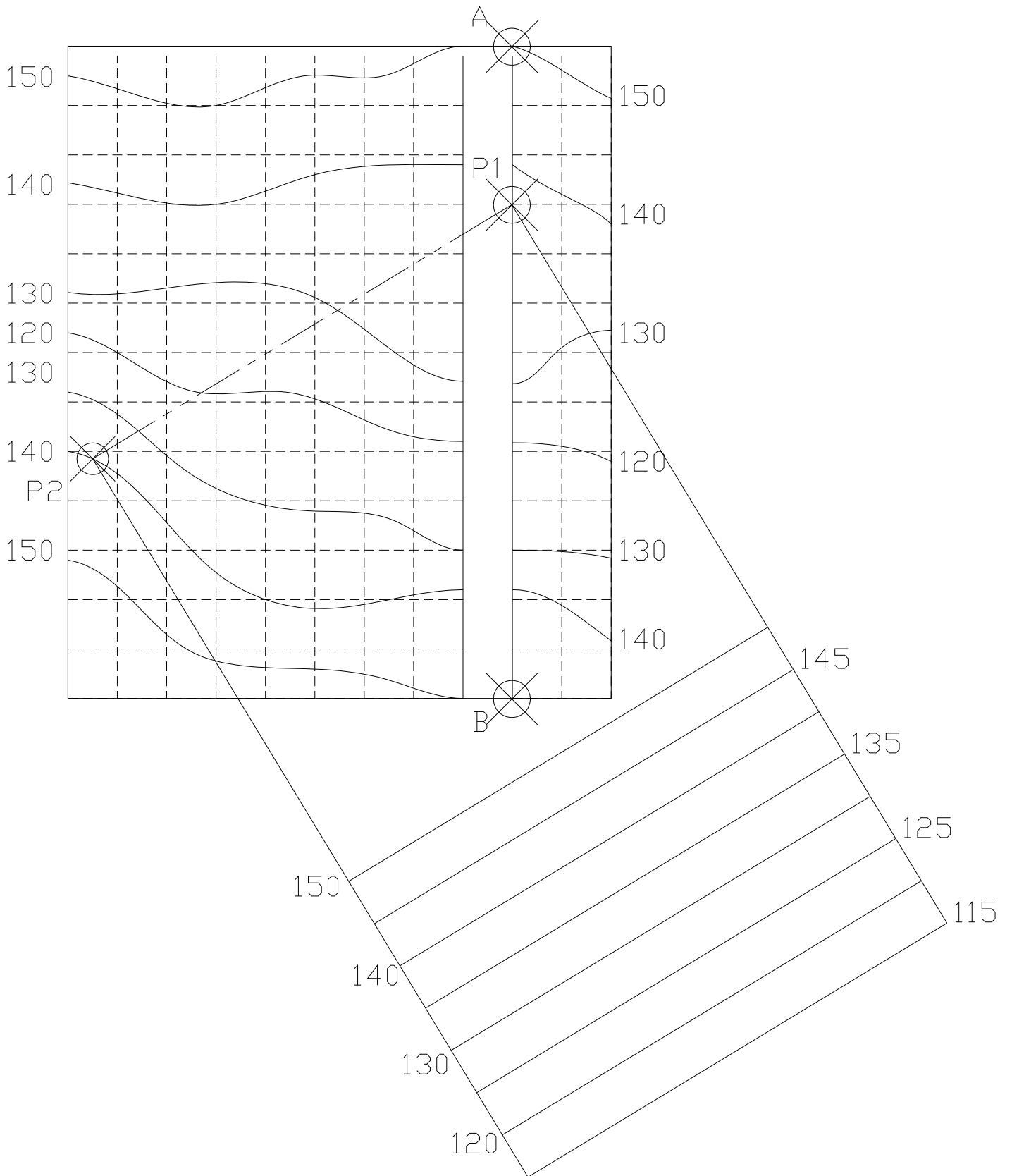
**12**      *Vertical, equal length to 3*

**13**

**Problem #5** (25 points)

The figure on the next page is a contour map that shows the top of an earthen dam to be build on an existing landscape. Line AB represents the water side wall of the dam, which is 10 m wide at the top. The left side of the dam is supported by a fill with a fill ratio 1:2. The squares on the contour map grid are 10 m x 10 m. The top of the dam is at a constant elevation of 150 m. The phantom line represents the center of a “runoff” pipe. The pipe at point P1 is at an elevation of 145. The distance from point P1 to point P2 on the contour map (i.e. the horizontal distance) is 100 m. The pipe has a downward grade of 20% from P1 to P2.

- a) Draw interpolated contour lines on the contour map that represent elevations that are half-way between the values of the contour lines shown (i.e. draw 145 m, 135 m and 125 m elevation lines).
- b) Draw the limits (toe) of the fill on the contour map. You must show your work to receive full credit.
- c) In the space provided, draw the surface profile of the modified land in the strike direction of the pipe. Note: the top surface will be “fill” at some locations, and unaltered land at other locations.
- d) Draw the pipe as a solid line in the profile view.
- e) Indicate and label where the pipe is exposed (i.e. the points where it comes out of the fill or the land) on both the profile map and the contour map.



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