E 28, Midterm Examination #1, Fall 1996

Name _____

Section # _____

Closed Book Examination

Time Limit: 50 minutes

Total Points Available: 100

4 problems

Scores:

1. _____
2. _____
3. _____
4. _____

Total: _____

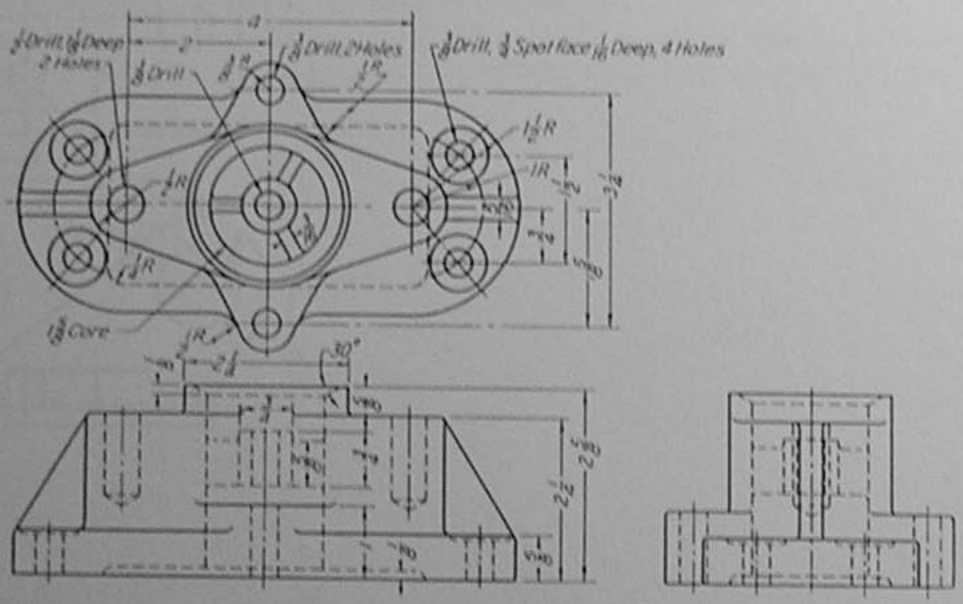
E 28, Midterm Examination #1, Fall 1996

Name _____

Section # _____

Problem #1 (25 points)

The top, front, and right side views of an object are shown below. It is desired to *replace* the front view and the side view with appropriate section views to reveal the interior detail of all the holes, but still show exterior features. Create the necessary section views, indicating on the top view the location of the section lines. It is not necessary to scale or dimension the sketch, or sketch to the exact dimensions, however some reasonable proportions are expected. The sections views should be sketched large enough to show the detail in each section.



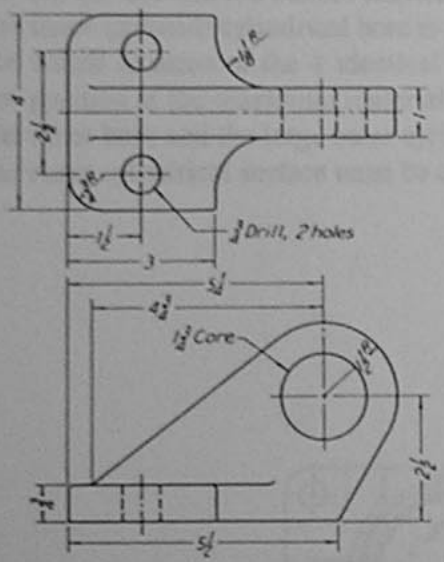
E 28, Midterm Examination #1, Fall 1996

Name _____

Section # _____

Problem #2 (20 points)

The figure below shows the top and front views of an object. Sketch an oblique rendition of the object. It is not necessary to scale or dimension your sketch; however, some reasonable proportions are expected. The sketch should be large enough to show the detail of the object. Apply proper shading to accent the surfaces.



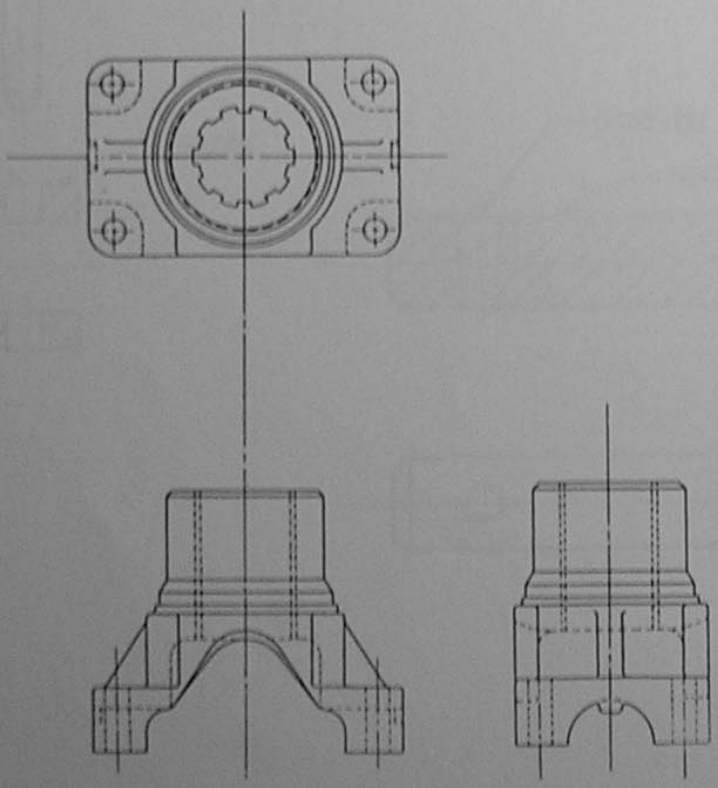
Name _____

Section # _____

Problem #3 (30 points)

The figure below shows the top, front, and right side views of a universal joint housing. Add the necessary tolerance control features to the drawing to specify the following. It is not necessary to add size or location dimensions to the features of the part.

a) The bottom surface is flat within 0.005 mm.
b) The top surface and the bottom surface are parallel to within 0.010 mm.
c) The inner (splined) cylindrical bore is perpendicular to the bottom surface to within 0.020 mm
d) The actual location of the 4 identical holes may deviate within a diameter of 0.050 mm from their true position at the maximum material condition of each hole.
f) The inner bore and the large outer cylindrical surface must be concentric to within 0.015 mm.
g) The outer cylindrical surface must be contained in a cylinder within a tolerance of 0.035 mm.



E 28, Midterm Examination #1, Fall 1996

Name _____

Section # _____

Problem #4 (25 points)

Consider the mating parts below. The shaft has a diameter of $\phi 10 - 0.02$ mm, and the housing bore has a diameter of $\phi 10 + 0.02$ mm, so that the two parts will always fit together (with a line-to-line worst case). After the parts are assembled, they are to be pinned through the cross holes using a precision pin with a diameter $\phi 3 \pm 0.005$ mm. The cross holes each have a diameter of $\phi 3.05 \pm 0.01$ in both the shaft and the housing. A clearance fit must be maintained at the cross holes of both the shaft and the housing. Assume that the location and orientation of the cross hole in the housing is, for all practical purposes, perfect. Assume that only the tolerances on the location of the cross hole on the shaft are significant (e.g. there is no need to consider perpendicularity, etc.). Specify the required tolerances on the location of the cross hole on the shaft, using the largest tolerances possible to ensure clearance fits at the pin. Properly label the drawing of the shaft below, indicating all known dimensions, tolerances, and any required reference features.