AutoCAD Laboratory (you may visit: http://www.cadtutor.net/acad/)

Session 8, week 8

Content of the laboratory: Polylines

1. Drawing POLYGONs
2. Drawing DONUTs
3. Using FILL command
4. Drawing straight polyline segments
5. Editing polylines with PEDIT
6. Creating parallel objects with OFFSET
7. Drawing SOLIDs
8. Making and viewing slides
9. Drawing and editing multilines
10. Drawing POINTs
11. Using SKETCH command
12. Review material
13. Applications
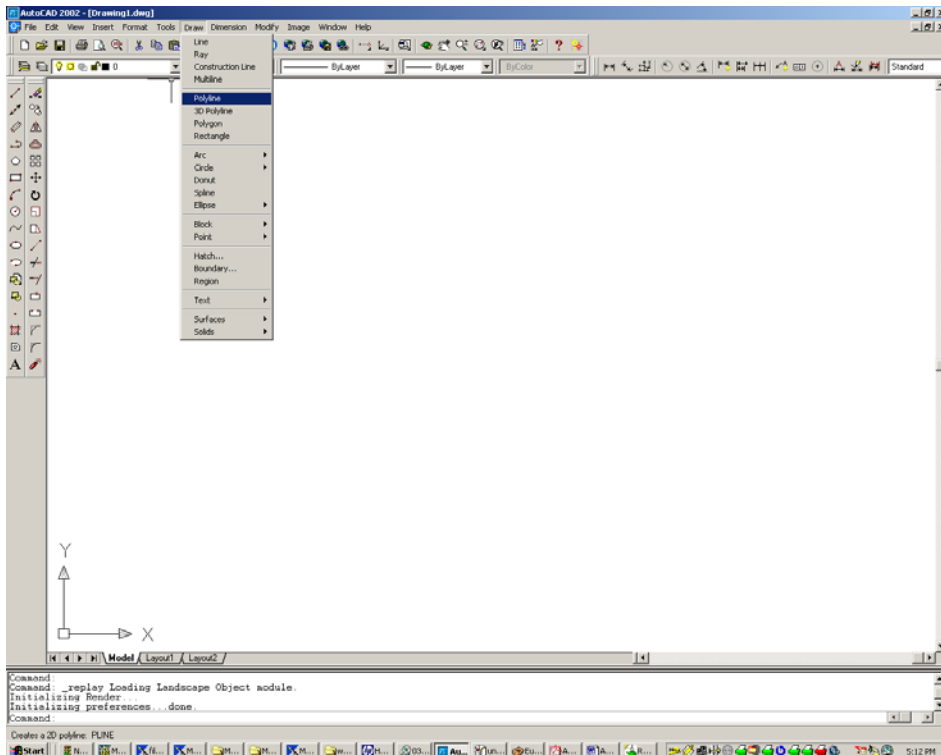
The pages that follow contain few applications that you should work during the laboratory period or after.
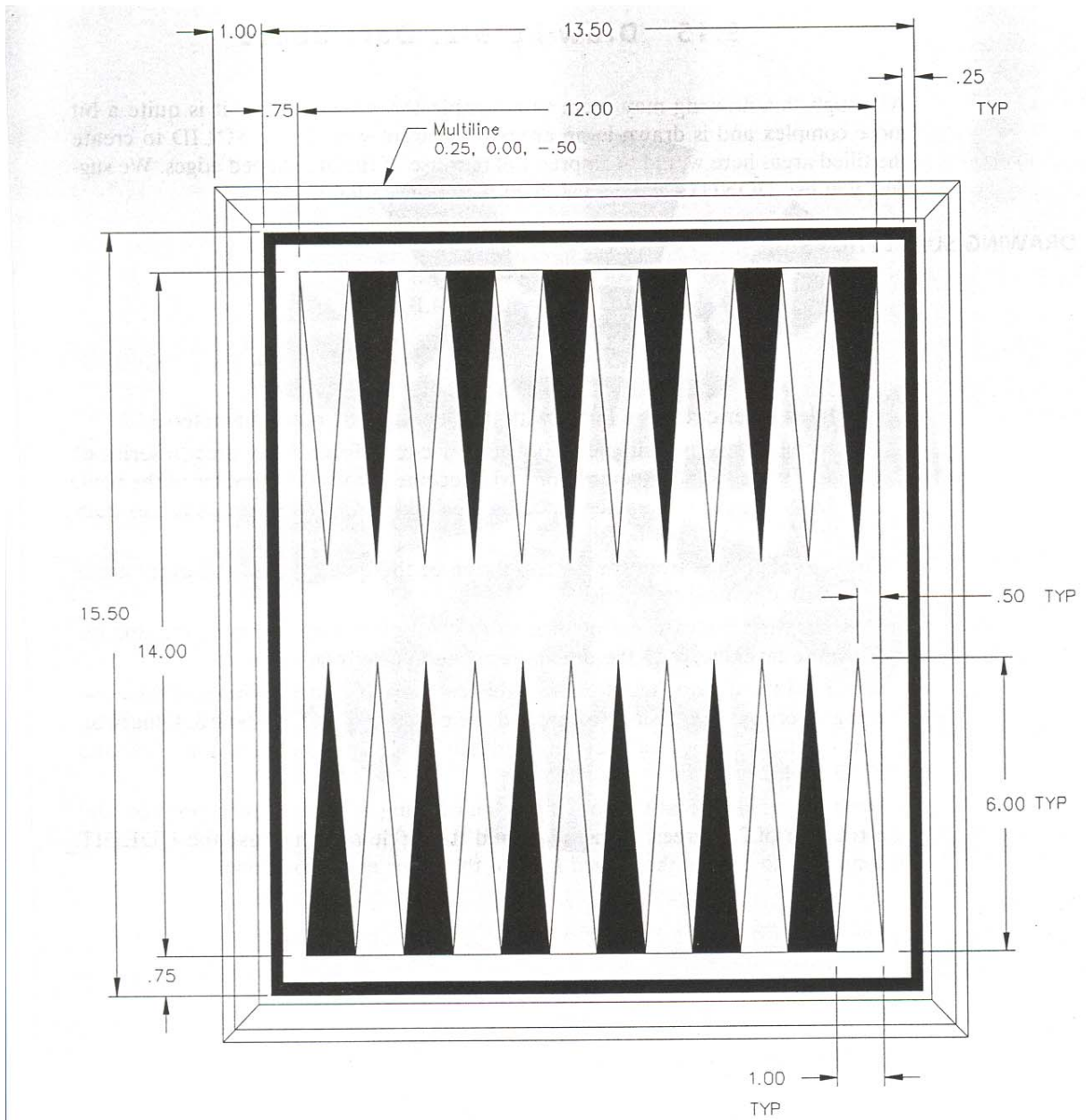
9.14   Drawing 9-1: Backgammon Board

This drawing should go very quickly. It is a good warm-up and will give you practice with MLINE, PLINE, and SOLID. Remember that the dimensions are always part of your drawing now, unless otherwise indicated.

DRAWING SUGGESTIONS

GRID = 1.00
SNAP = 0.125

- First create the multiline line style for the frame with three elements 0.25, 0.00, and −0.50 and joints on as shown. Then draw the 15.50 × 17.50 multiline frame.
- Draw a 0-width 15.50 × 13.50 polyline rectangle and then OFFSET it 0.125 to the inside. The inner polyline is actually 0.25 wide; but it is drawn on center, so the offset must be half the width.
- Enter the PEDIT command and change the width of the inner polyline to 0.25. This will give you your wide filled border.
- Draw the four triangles at the left of the board and then array them across. The filled triangles are drawn with the SOLID command; the others are just outlines drawn with LINE or PLINE. (Notice that you cannot draw some solids filled and others not filled.)
- The dimensions in this drawing are straightforward and should give you no trouble. Remember to set to layer "dim" before dimensioning.

BACKGAMMON BOARD

Drawing 9-1

Although this drawing may seem to resemble the previous one, it is quite a bit more complex and is drawn in an entirely different way. Using SOLID to create the filled areas here would be impractical because of the arc-shaped edges. We suggest you use DONUTs and TRIM them along the radial lines.
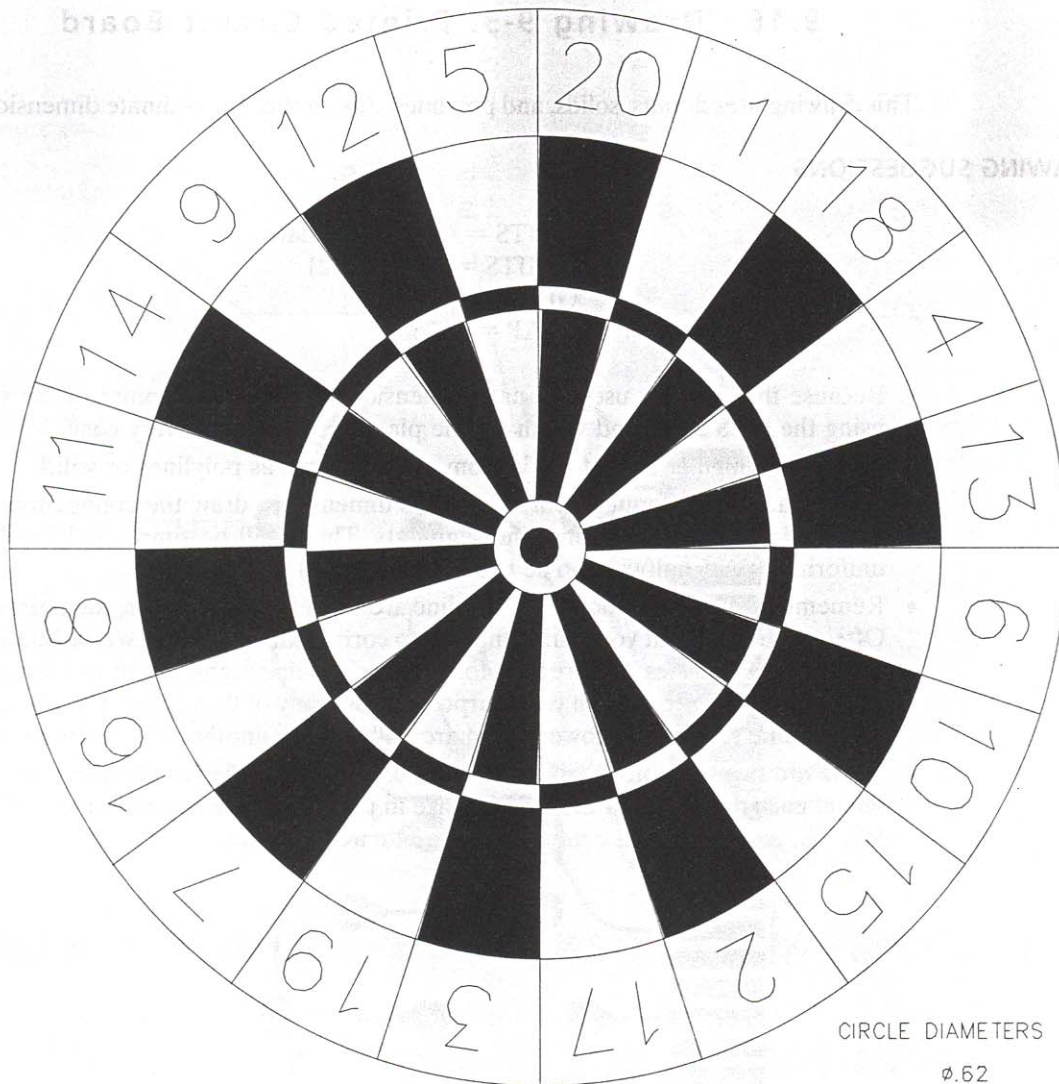
DRAWING SUGGESTIONS

LIMITS = (0,0) (24,18)
GRID = 1.00
SNAP = 0.125

- The filled inner circle is a donut with 0 inner and 0.62 outer diameters.
- The second circle is a simple 1.50 diameter circle. From here, draw a series of donuts. The outside diameter of one will become the inside diameter of the next. The 13.00 and 17.00 diameter outer circles must be drawn as circles rather than donuts so they will not be filled.
- Draw a radius line from the center to one of the quadrants of the outer circle and array it around the circle.
- You may find it easier and quicker to turn fill off before trimming the donuts. Also, use layers to keep the donuts separated visually by color.
- To TRIM the donuts, select the radial lines as cutting edges. This is easily done using a very small crossing box around the center point of the board. Otherwise you will have to pick each line individually in the area between the 13.00 and 17.00 circle.
- Draw the number 5 at the top of the board using a "middle" text position and a rotation of 2 degrees. Array it around the circle and then use the DDEDIT command to change the copied fives to the other numbers shown.

DART BOARD

Drawing 9-2

This drawing uses donuts, solids, and polylines. Also notice the ordinate dimensions.

DRAWING SUGGESTIONS

UNITS = 4-place decimal
LIMITS = (0,0) (18,12)
GRID = 0.5000
SNAP = 0.1250

- Because this drawing uses ordinate dimensions, moving the 0 point of the grid using the UCS command will make the placement of figures very easy.
- The 26 rectangular tabs at the bottom can be drawn as polylines or solids.
- After placing the donuts according to the dimensions, draw the connections to them using polyline arcs and line segments. These will be simple polylines of uniform 0.03125 halfwidth. The triangular tabs will be added later.
- Remember, AutoCAD begins all polyline arcs tangent to the last segment drawn. Often this is not what you want. One way to correct this is to begin with a line segment that establishes the direction for the arc. The line segment can be extremely short and still accomplish your purpose. Thus many of these polylines will consist of a line segment, followed by an arc, followed by another line segment.
- There are two sizes of the triangular tabs, one on top of the rectangular tabs and one at each donut. Draw one of each size in place and then use multiple COPY, MOVE, and ROTATE commands to create all the others.


PRINTED CIRCUIT BOARD
DRAWING 9-3
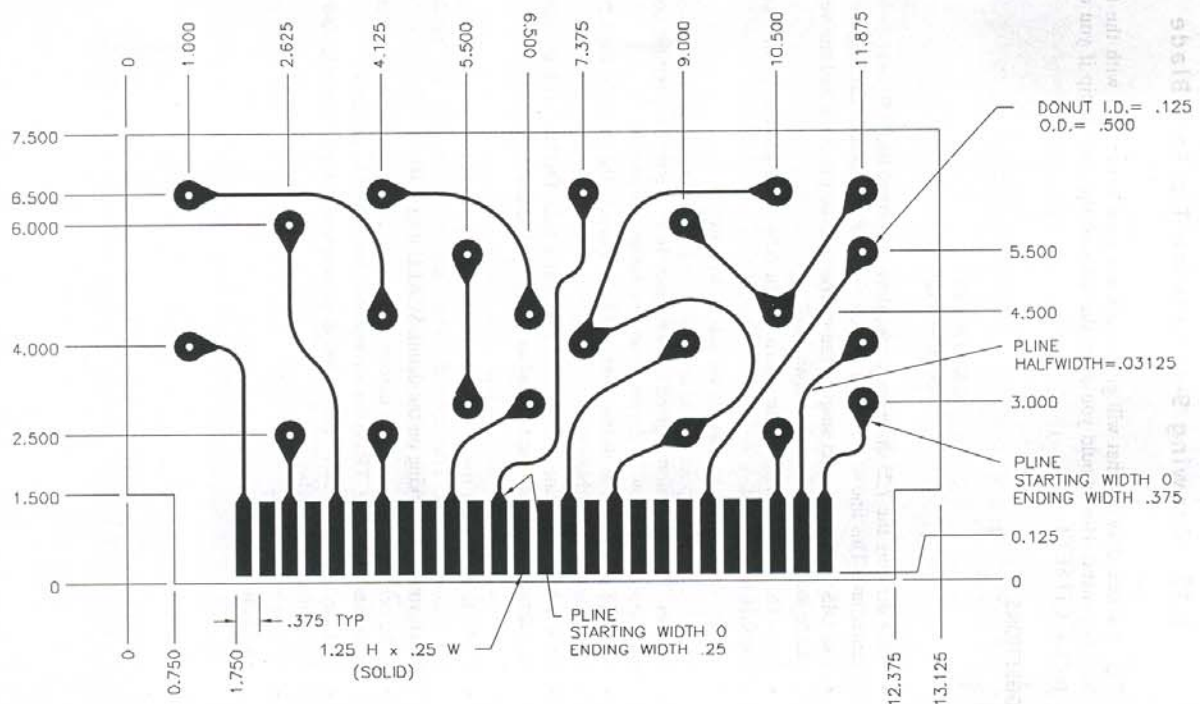
9.17   Drawing 9-4: Carbide Tip Saw Blade

This is a nice drawing that will give you some good experience with the OFF-SET command. How would you draw the sides of the carbide tip if you could not use OFFSET?

DRAWING SUGGESTIONS

GRID = 1.00
SNAP = 0.125

- After drawing the 7.25 diameter circle, draw a vertical line 1.50 over from the center line. This line will become the left side of the detailed "cut."
- Use DIST with an object snap to the intersection of the circle and the vertical line to locate the 0.58 vertical distance.
- Draw the horizontal center line through the 0.58 point and the vertical center line 0.16 to the right.
- Use the center lines in drawing the 0.16 radius arc.
- From the right end point of the arc, draw a line extending out of the circle at 80 degrees. The dimension is given as 10 degrees from the vertical, but the coordinate display will show 80 degrees from the horizontal instead.
- OFFSET this line 0.06 to the right and left to create the lines for the left and right sides of the carbide tip.
- Draw a horizontal line 0.12 up from the center line. TRIM it with the sides of the carbide tip and create 0.06 radius fillets right and left.
- Draw the 3.68 radius circle to locate the outside of the tip.
- BREAK and TRIM the three 80-degree lines, leaving three extension lines for use in dimensioning. Then copy the whole area out to the right for the detail. When you start working on the detail, SCALE it up 2.00.
- In the original view, erase the extension lines and then array the cut and carbide tip around the circle. TRIM the circle out of the new cuts and tips.
- You can use a "Rotated" dimension at 10 degrees to create the 0.12 and 0.06 dimensions in the detail.
- Be sure to type in your own values as you dimension the detail, since it has been scaled.

10°

.12

.06

.58

.12

.16 R

.06 R

SCALE: 2/1

1.50

3.68 RAD

7.25 DIA

2.00

.62 DIA

.25 DIA
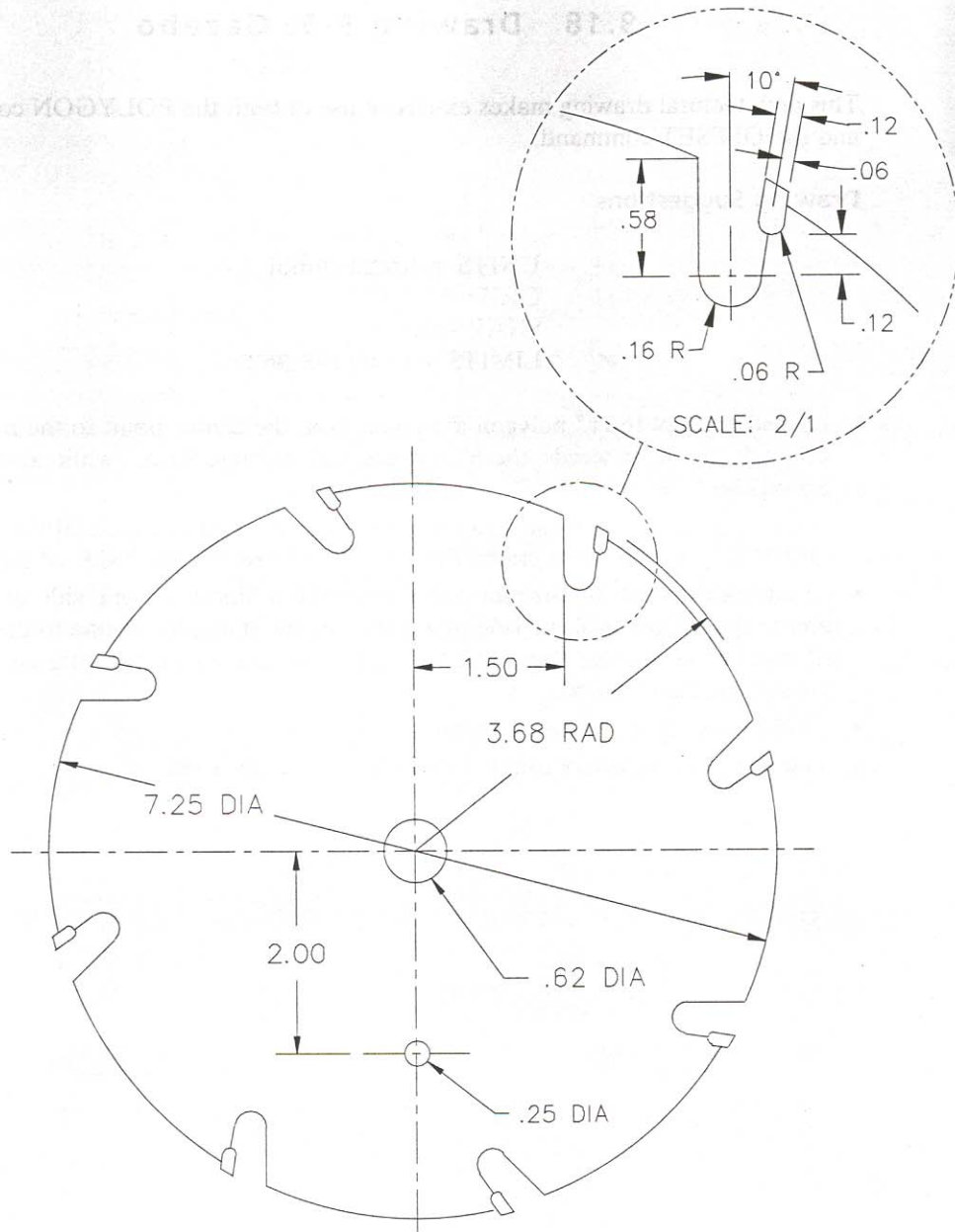
CARBIDE TIP SAW BLADE

Drawing 9–4

9.18 Drawing 9-5: Gazebo

This architectural drawing makes extensive use of both the POLYGON command and the OFFSET command.

Drawing Suggestions

UNITS = Architectural
GRID = 19
SNAP = 20
LIMITS = (0',0') (48',36')

- All radii except the 6" polygon are given from the center point to the midpoint of a side. In other words, the 6" polygon will be "inscribed," while all the others will be "circumscribed."
- Notice that all polygon radii dimensions are given to the outside of the 2" × 4". OFFSET to the inside to create the parallel polygon for the inside of the board.
- Create radial studs by drawing a line from the midpoint of one side of a polygon to the midpoint of the side of another, or the midpoint of one to the vertex of another as shown; then offset 1" each side and erase the original. Array around the center point.
- TRIM lines and polygons at vertices.
- You can make effective use of MIRROR in the elevation.

ROOF FRAMING

FRONT ELEVATION
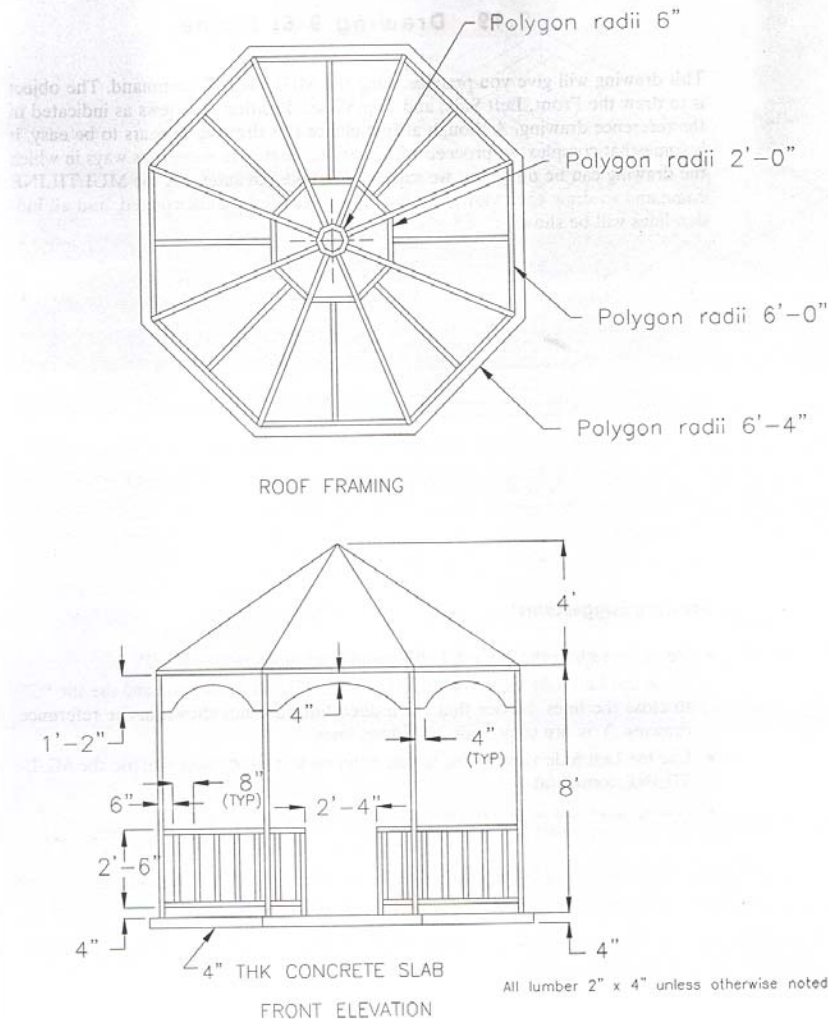
A short test will be conducted now. The lab instructor will formulate the question.