CADCAM 2D

Key Concepts

Create Rectangle, [icon] ▾ Click your first point (Origin),
draw a rectangle approximately and click again(this is called sketching)
Now we will adjust the exact sizes.   Width=6   Height=3.5

[toolbar] 6.0 ▾ ⇕   3.5 ▾ ⇕   [icons]   ⊕ ✓ ?

⊕ Apply (clicking apply locks the values for our rectangle
and allows us to make another rectangle)

Make sure this is on!

Now we make the inside rectangle
Click Origin, Sketch inside rectangle
Width=5 Height=2.5
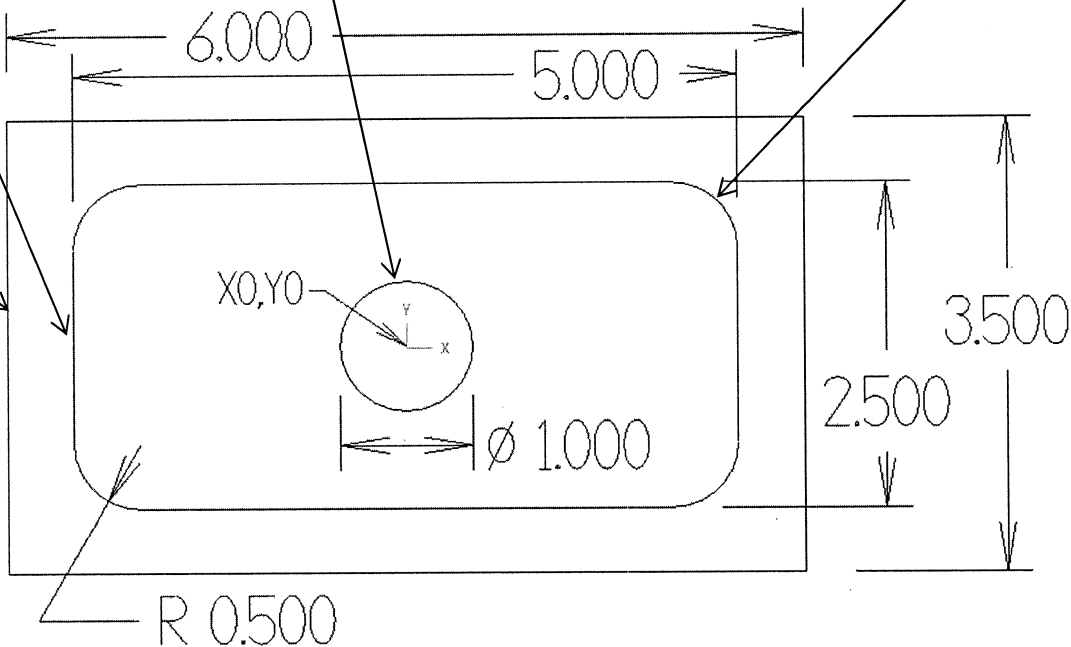✓ Ok (Ok locks the values like apply, but also clears the ribbon bar)

⌐ ▾ Fillet Entities (this is a rounded corner)

Set Radius to .5 ⊙ 0.5 ▾ ⇕
Select one line, then the other, continue this
all around the inside rectangle. ✓

⊕ ▾ Create circle center point, Select Origin, Sketch circle
Diameter= 1   ⊕ 1.0 ▾ ⇕

✓ Ok

6.000

5.000

X0,Y0

Ø 1.000

3.500

2.500

R 0.500

Assignment #1

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CADCAM 2D

Key Concepts

- Create Circle Center point
  Click origin, Sketch circle
  (this will be the smaller circle)   1.88   Diameter=1.88

  Apply
  Now make the largest circle
  Click origin, Sketch circle   1.5
                                      Radius=1.5

- Create Circle Center point   Dia=.75, click the Diameter symbol to lock the value
  (locking the value allows you
   to place multiples of the same object)

  Click the Fast Point icon, Type in -1.875,0 | Fast Point is used to when you
  Click the Fast Point icon again, Type in 1.875,0 | know the coordinates of an object.
  (this will place the "bolt" holes)

       Center these .750 Radius holes on the above circles

- Create Fillet - Radius 1.130, Turn trim off, click circles with adjoining fillets
       1.13   Normal

       Use trim   1 entity to trim excess   Trim off

       You will also need to use trim, divide.

R 1.130

R 1.500

Ø 1.880

Ø 0.750

R 0.750

1.875

X0,Y0
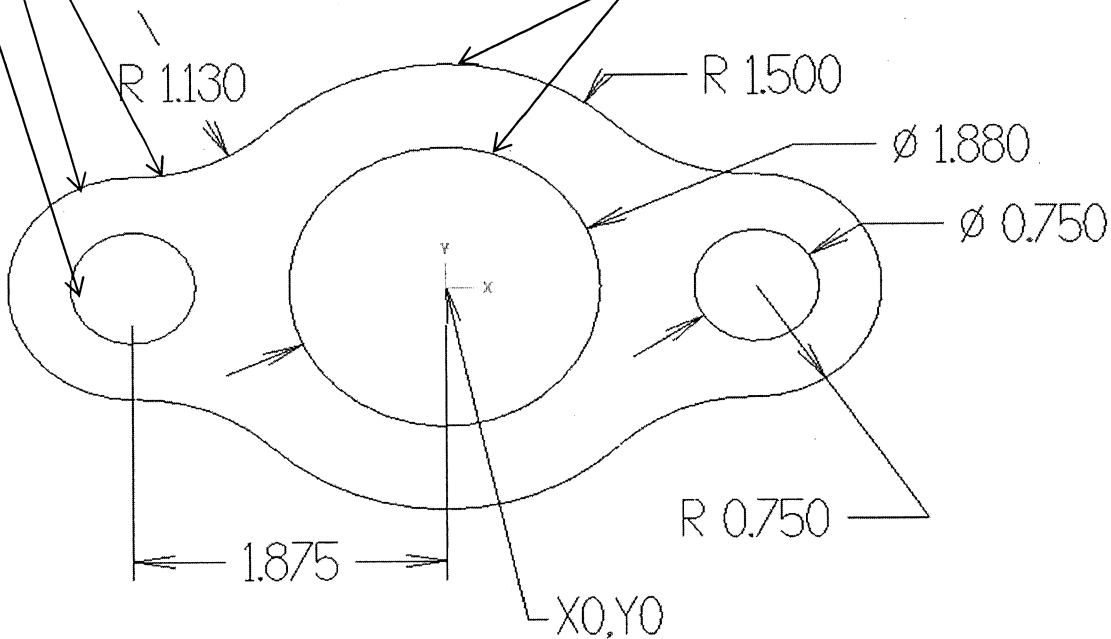
Assignment #2

Pikes Peak Community College

CADCAM 2D

Key Concepts

Create Rectangle Width=4 Height=4, Anchor to center, place at origin

4.0   4.0

And again   3.0   3.0

Create arc tangent ▾ 2 entities   set Radius to .375
Choose the lower corners of the 3" rectangle
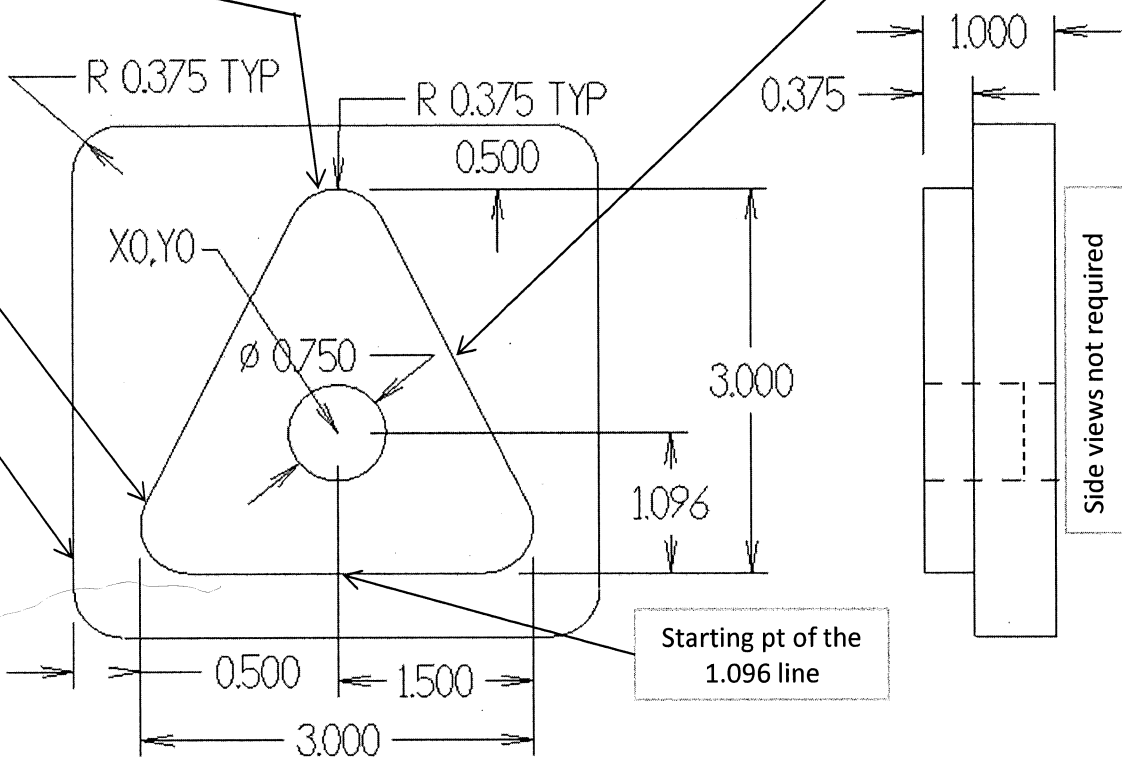
Create arc tangent ▾ 1 entities   set radius to .375

Create line, ▾ Tangent   choose the two arcs

To place the center circle. Create line ▾ Vertical 1.096
Put the D .75 circle at the tip of the line

> This line should start at the bottom of the small rectangle.

Move / Translate the drawing to the origin.
Choose the center of the .750 Arc as the point to place on the origin

R 0.375 TYP

R 0.375 TYP

0.500

1.000

X0,Y0

0.375

Ø 0.750

3.000

1.096

Side views not required

> Starting pt of the 1.096 line

0.500   1.500

3.000

Assignment #3

Pikes Peak Community College

CADCAM 2D

Key Concepts

- ⊕ ▾ Create a 2" circle on the origin   ⊕ 2.0 ▾

- ↖ ▾ Create line endpoints, from origin, sketch the line.
  📐 3.0 ▾   📐 60.0 ▾   ✓

- ⊕ ▾ Create a 2" circle, at the end point of the above line

- ▣ Create, Fillet, Entities, Radius=.125,Trim off
  ⊕ 0.125 ▾   ？ ⌐ Normal ▾ ⌐   ◇ ■ ⊕ ✓
  Fillet ends and trim excess

- ⬚ Xform rotate, Choose the fillets, and the 2"arc

- ⬤ End Selection, copy 2 times, angle 120

      Move Copy Join
  ▨   ○   ◉   ○   ◕   ⬚

  # 2   ◉ Angle between   ∡ 120.0 ▾
           ○ Total sweep

                          ◉ Rotate   ○ Translate

120.00°

R 2.000

R 0.125 TYP

X0,Y0

R 2.000
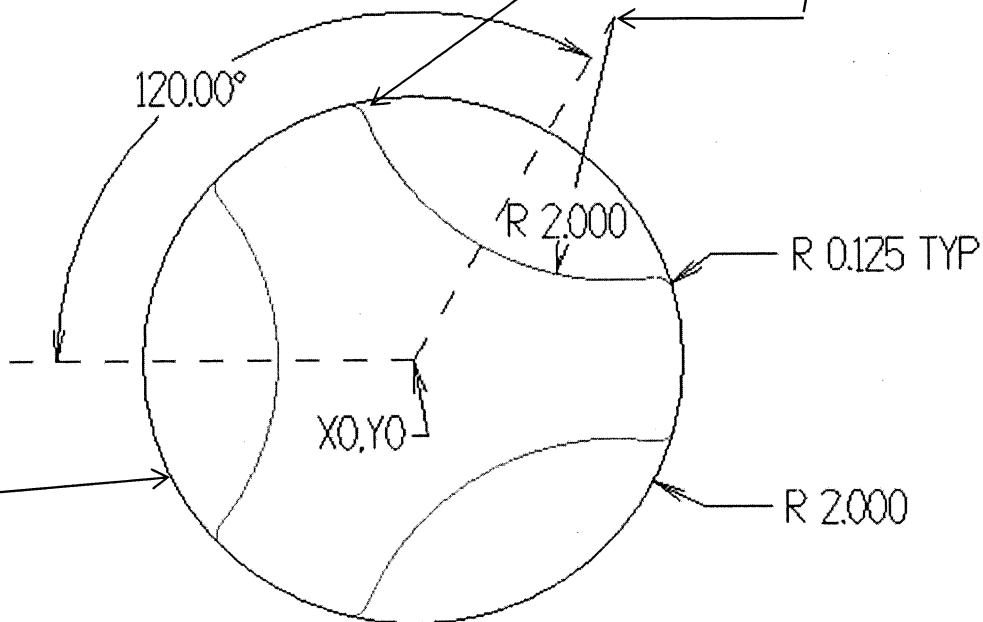
Assignment #4

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CADCAM 2D

> Any drawing that is symmetrical you have the option of
> drawing half of it, and mirroring it across.

Create Rectangle, centered on the origin Width=5.5 Height=2.5

| 5.5 | | 2.5 | | | (this will be the outside rectangle) |

Fillet entities, 0.5 (the bottom two corners)

Create a line Tangent, sketch 70.0 ends will need to be trimmed

Fillet entities, 0.5 Trim

Create line parallel

> Select the line, Click anywhere on the
> inside of the rectangle, this indicates the

Create Circle At center of .5 R arcs

0.250 TYP

20°

Ø 0.250

X0,Y0 Y x

2.500

R 0.500 TYP

R 0.250 TYP

5.500

Assignment #5

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CADCAM 2D

Key Concepts

Note: Mirror may be used after drawing exactly half of this geometry.

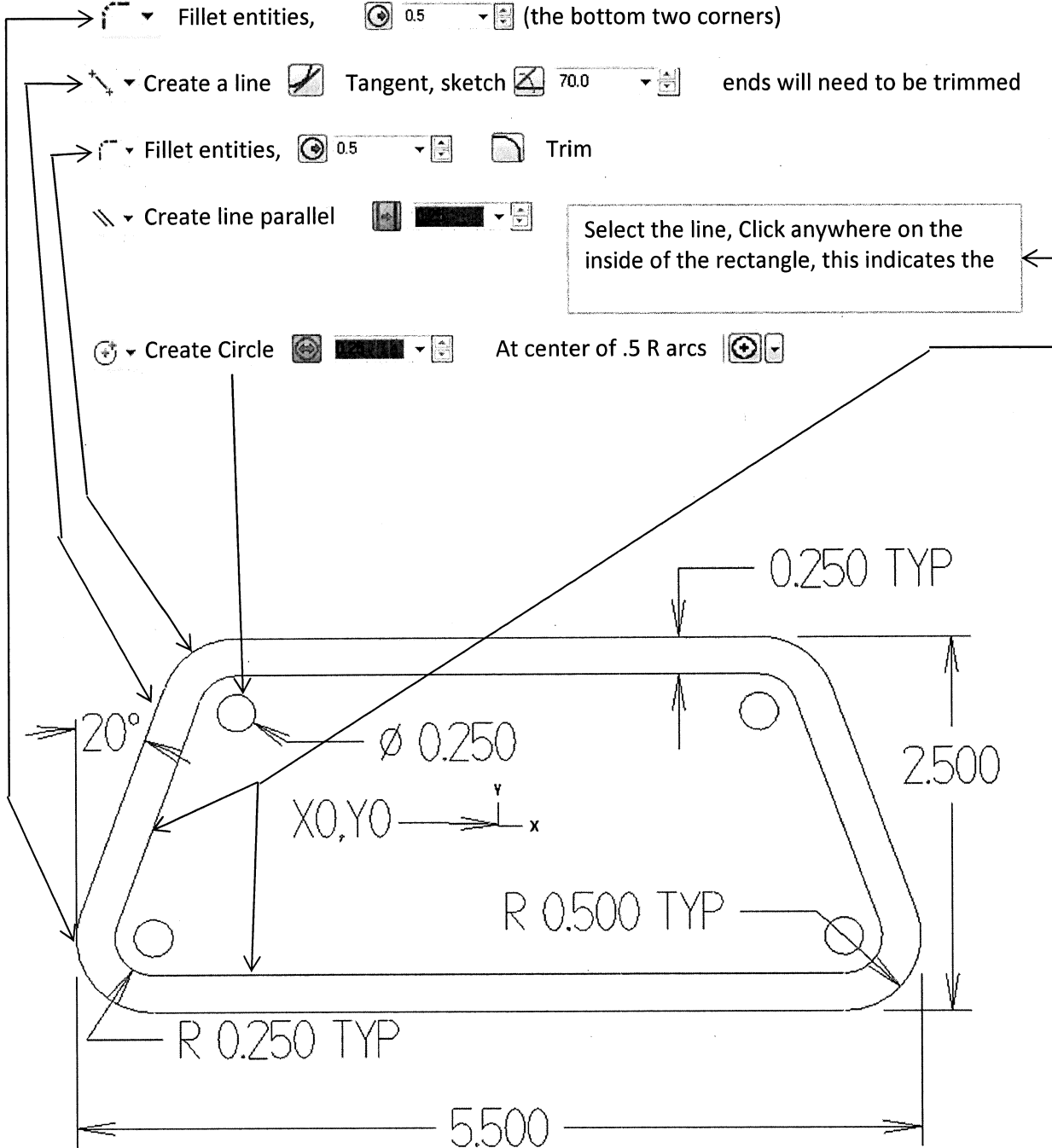- Create Rectangular shape (not a rectangle, its under Create on the Menu bar)
  Width= 8.5, Height = 4, Fillets=.25, Anchor to lower center
  Click the origin **Before** ✓

  Anchor
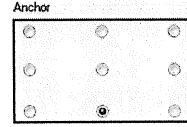
- Click Fast Point   Type -1.5,0   Sketch the line,
  angle 120

- Distance 2.5   2.5   Select the bottom line of the rectangle
                             Parallel in the upward direction

- Create a 2" circle at the mid point of the top line of the rectangle

- Create Line   Tangent to the 2" arc

  If you only drew half the drawing then...
- Xform Mirror, select entities   ⊙   ✕ 0.0   ✓

R.250

45.00°

R 2.000

R.500

4.000

X0,Y0

R 0.750

60.00°

2.500

X

1.500

4.250

Assignment #6

Pikes Peak Community College
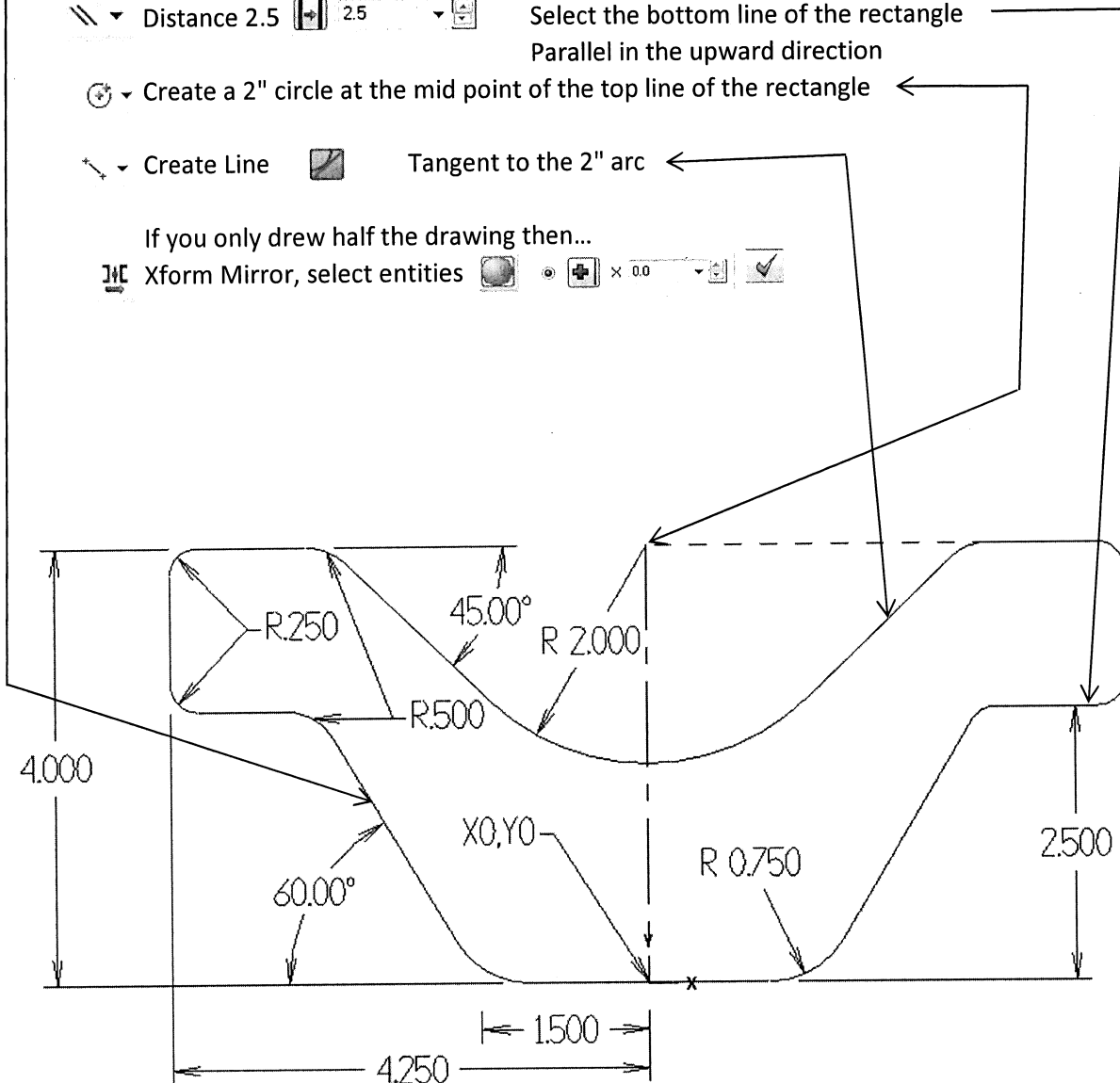
CADCAM 2D

Key Concepts

Create circle center point, R.095 on origin   0.095

Create circle center point, D .090 on origin   0.09

Xform Translate, select both arcs   End selection, Select Copy   025

Create Line, tangent, select the R.095 arc   72.0

For the horizontal and vertical lines in this geometry create a vertical line on the Y axis and a horizontal line along the X axis.
You can then use parallel lines and the dimensions on the print below.

Create Line Parallel   0.3125   try entering 5/16 as a fraction)

Create Arc Tangent, 2 entities
Select the one to keep

R 0.031

0.375

18°

R 0.063

Ø .090
(2 PLACES)

R 0.125

5/16

R .25

R 0.063

0.125

X0,Y0

R 0.095 TYP

0.250
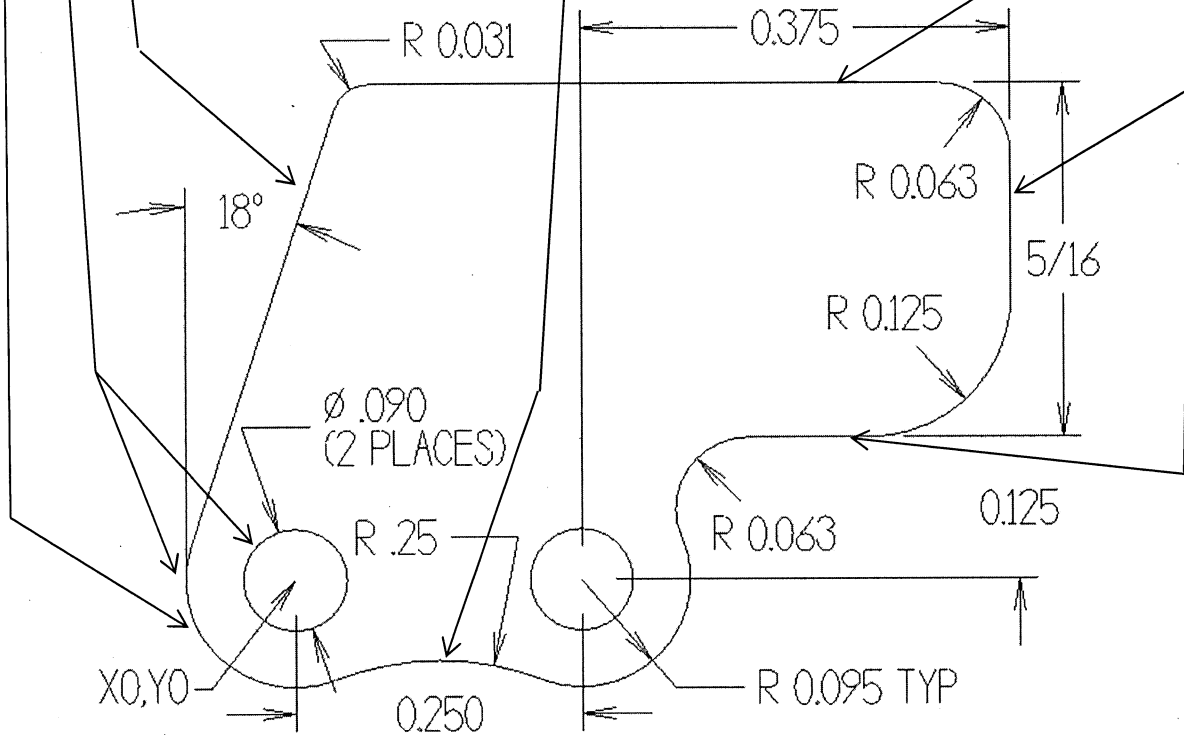
Assignment #7

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CADCAM 2D

Key Concepts

⊕ ▾ Create Arc, Diameter=4, Centered on the Origin   ⊕ 4.0   ▾ ⬍
(This is the big outside circle)

◁ ▾ Create Arc Tangent, 1 entity   ◉
Set the Radius   ◉ 0.5   ▾ ⬍
Select the arc to be tangent to (click anywhere on the 4" arc)
Specify the tangent point (where all the arcs come together)
Select which arc to keep.   ⊕   Apply
Set the Radius for the next arc you want to make. (probably 1" radius)
Continue for all the following arcs

⊕ ▾ Create circle center point,   ⊕ ▬▬▬ ▾ ⬍

Place at the center of the R.5 arcs

Ø 0.750
(2 PLACES)

R 0.500
R 1.000
R 1.500

X0,Y0

Assignment #8

Pikes Peak Community College

CADCAM 2D

- Create Rectangular shape (not a rectangle, its under Create on the menu bar)
  Width=4.5, Height=2.88
  Anchor to Right Center
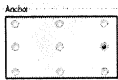
- Create Circle Center Point, Place both arcs at Origin

- Most remaining lines & circles may be plotted by parallel lines, lines tangent to an arc or using fast point

- Chamfer entities (under fillets)

  0.32   1 Distance

45°

R 0.640 TYP

R 0.800

R .32 TYP

R 0.800

Ø 0.960

1.600   1.280

X0,Y0

0.320

4.500
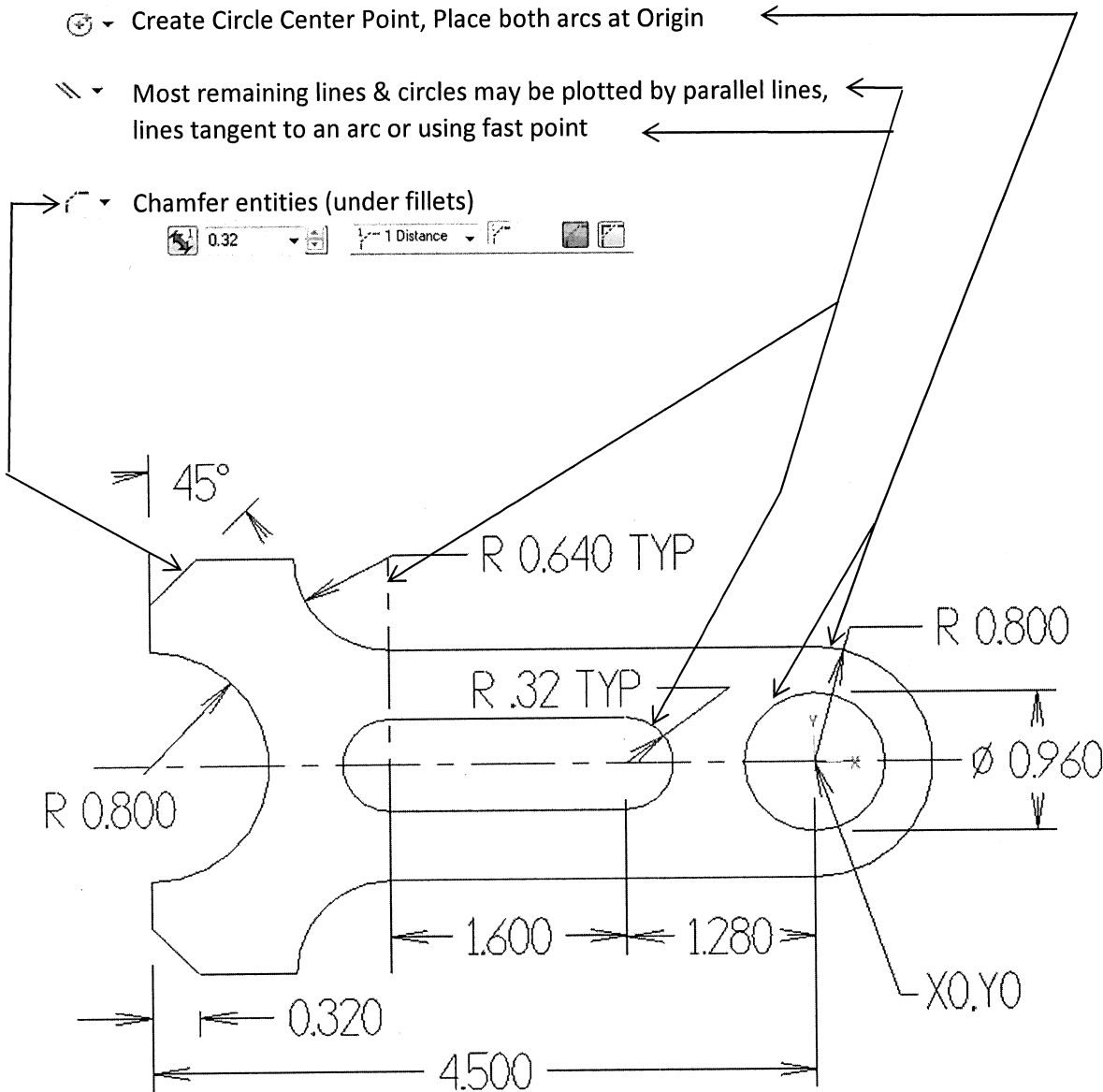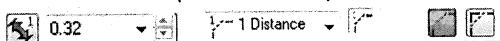
Assignment #9

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CADCAM 2D

- Create Rectangle, place lower left corner on the origin and sketch
  Width=8 Height=5   8.0   5.0

- Xform Offset contour, click the rectangle,   Move Copy   (this will create parallel lines on the **inside** of the

- Fillet Entities (3 Places)

- Create line end point - draw the angled Line from fillet to fillet
- Create Line parallel - Create 2 lines .250 from the above line.

- Trim/Break/Extend (one entity) the center line so it meets the intersecting line
  Select the center line first and the top horizontal line second
- Trim/Break/Extend   -1.0   Cut 1 inch off both ends of the line

  This is to make sure the bolt holes are spaced properly

- Break many pieces, select the center line,   11

- Place .250 Holes (.25 Diameter) at all 12 endpoints

0.500   0.250

1.000

Drill 1/4 Holes
12 Places EQ Spaced

0.5 TYP
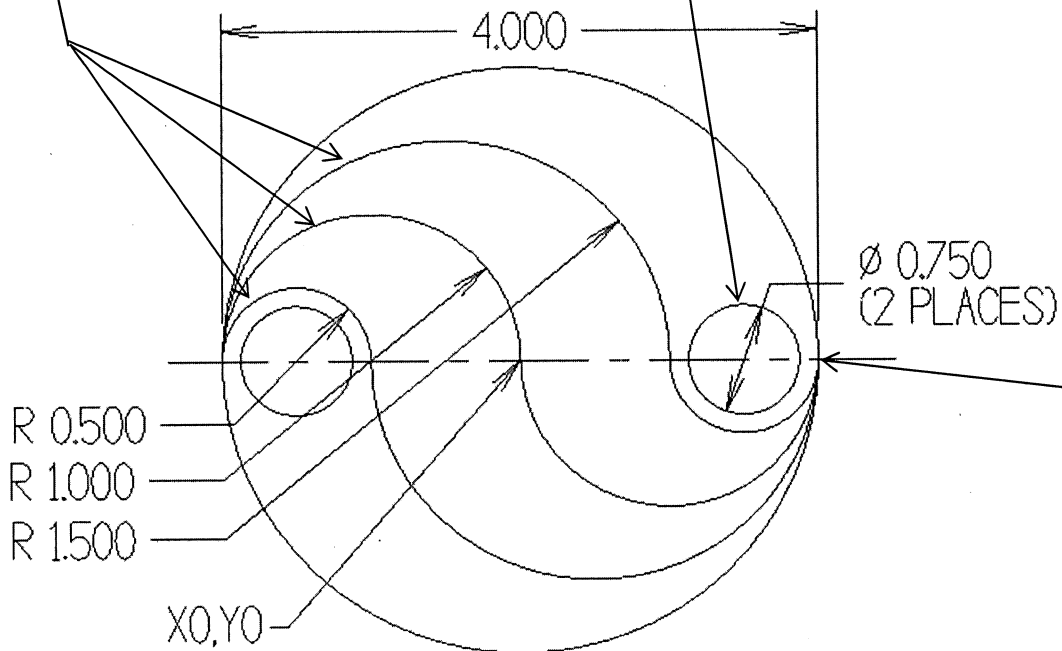
5.000

1.000

4.000

X0,Y0

R 0.375 TYP

7.000

8.000

Assignment #10

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CADCAM 2D

Key Concepts

Create, (on the menu bar) Letters, click True Type

Font - Arial
Font Style - Bold
Size - 10 - Click OK
Type your name
Choose Horizontal
Set height to 1"
Enter letter spacing .25 - Click OK
Place Letters at Origin
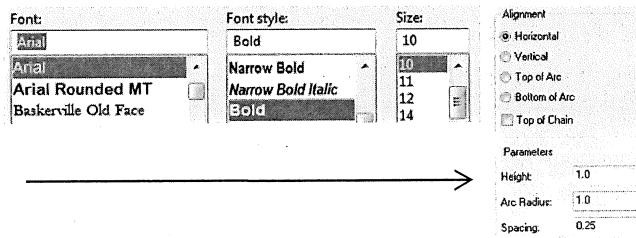
Create, (on the menu bar) Bounding Box
Turn off center point check box
Expand .25 on X, and Y
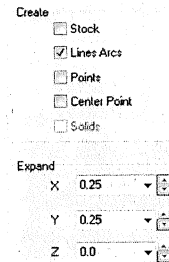
Make the outside rectangle by;
Create parallel lines off of this bounding box based on the dimensions on the print below.
You will need to trim, two entities to make the lines meet.

For the slot;
Create a parallel line 2.175 from the bottom line
Create a rectangular shape, 4.75 Wide .125 High
Select the Oval shape,
Place on the midpoint of the above line **Before** clicking OK
Xform move to origin after drawing is complete

4.75 WIDE X .125 HIGH SLOT
CENTERED OVER NAME

1.000   1.000

2.500
1.000 1.500

2.175

0.250 TYP   R 0.125

0.350

X0,Y0
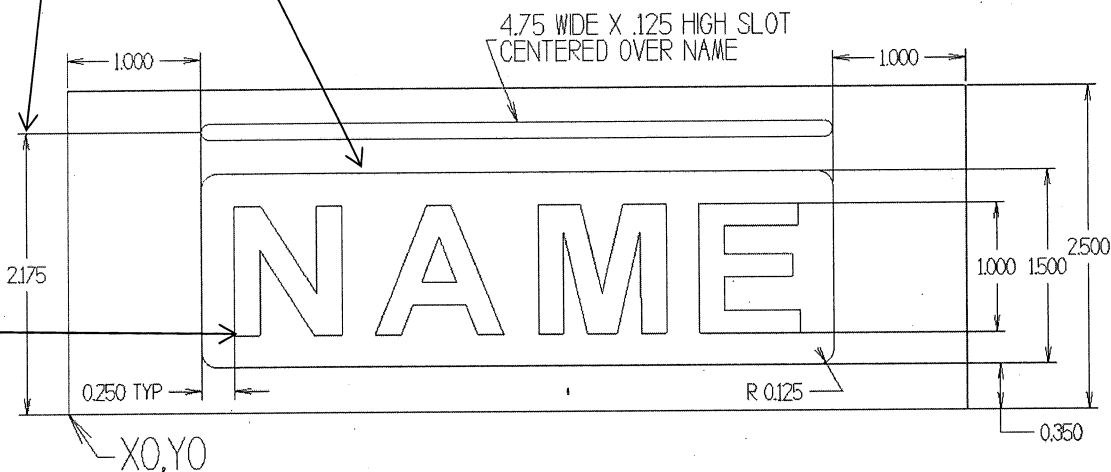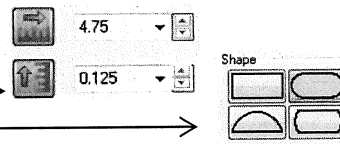
Assignment #11

Pikes Peak Community College

CADCAM 2D

Key Concepts

Create the two circles that are centered on the origin

Create Line from the origin
Angle=198.85
Length=6.355

Create Line, make sure tangent is on (the 1" circle)
Angle=168.873

Create line parallel, Side distance = 1.820

Most of the remaining lines may be plotted by parallel lines.

2.860

R 0.320

R 0.060

Ø 0.250

Ø 0.812

1.820

18.85°

0.520

1.75

1.000

R 1.875

R 1.000

5.400

X0,Y0

R 0.750

6.355

0.420

R 0.060
2 PLACES

18.85°
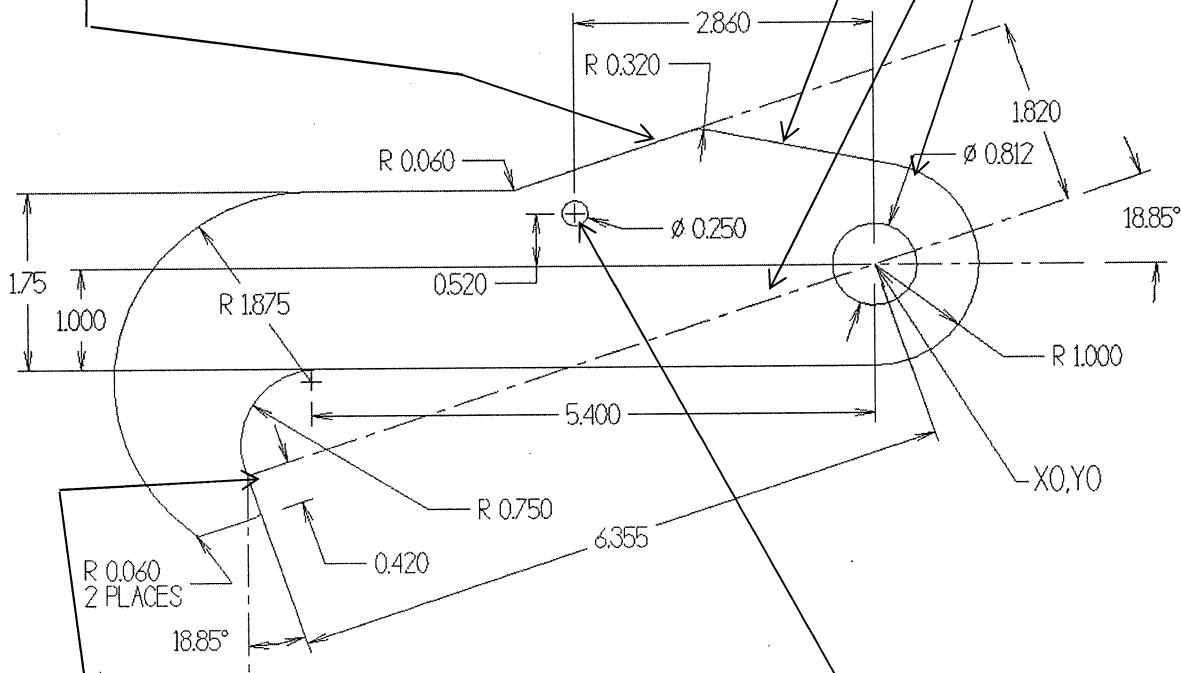
Create, Line, Perpendicular.
You may need to use a
parallel line also.

Use Fast Point to plot
this circle. Remember X
axis first.

Assignment #12

Pikes Peak Community College

CADCAM 2D

Key Concepts

→ For Flat

Create a horizontal line across the center of the .5R circle

For Y coordinate location - Enter .375 [⬍ 0.375 ▾ ⬍ ⬌] ←(make sure the horizontal button is on)

DRAW THIS ENTIRE FEATURE - THEN ROTATE! ←

Create the 6.5D and the 2.75R circles

Create a horizontal line from the origin to the right side of the 2.75R circle ←

Create another line from origin. Length=2.75, Angle=360/7 ←

Parallel both these lines, distance of .25 [⬌ 1.25 ▾ ⬍]

Fillet, Radius=25,(3 places)

Rotate this feature. Angle = 360/7

Ø 6.500

R 0.250
3 PLACES

0.875

R 0.500

R 2.750

0.500

Assignment #13

Pikes Peak Community College

CADCAM 2D

Key Concepts

◇ ▾   Create, (on the menu bar) Polygon

     ▦   6

     ⊘   1.0 ▾

     ○ Corner   ◉ Flat

     Place at Origin **BEFORE** clicking OK

⊕ ▾   Create the 6"D and the 4"D circles

     Create, (on the menu bar) Bolt circle

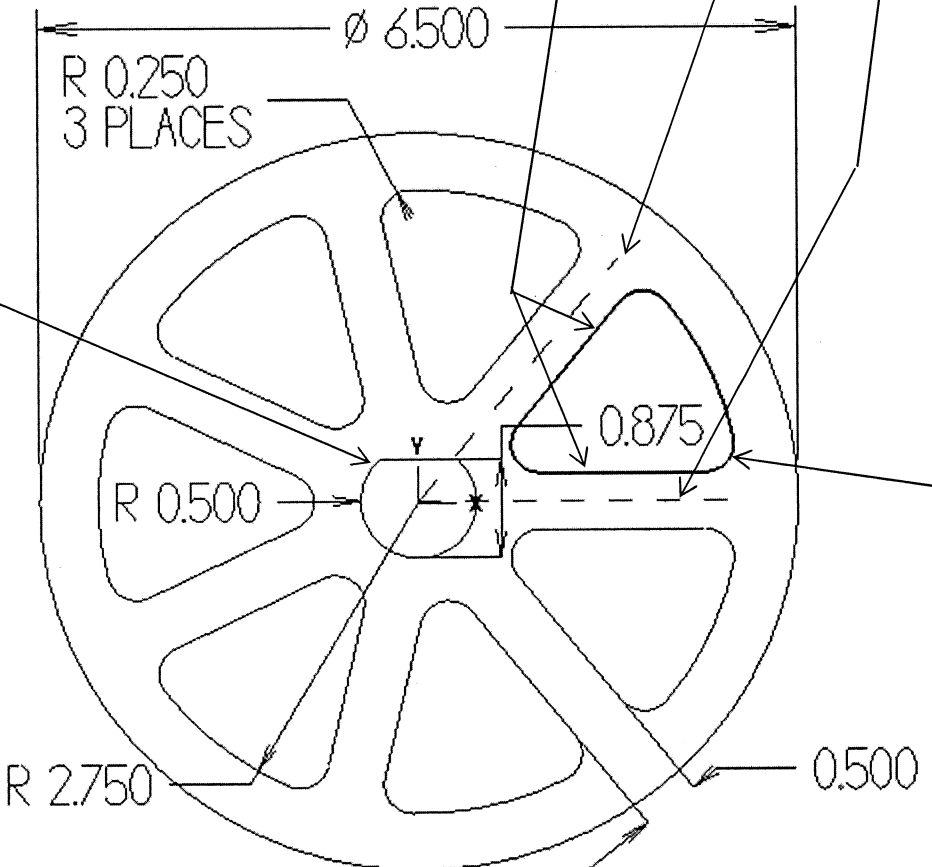|		Pattern		Create Entities
◕	⛶	☑ Full Circle		☐ Points
⊘ 2.5 ▾		⊙ ▦ 7 ▾		☑ Arcs 0.42188 ▾
		○ ✛ 51.42857 ▾		☐ Center Point
		△ 20.0 ▾		☐ Reference Circle

Ø 6.000

Ø 4.000

A

R 0.100

2.000

20°

Ø 5.

0.380

27/64 DRILL

A

1.125

0.750

SECTION A–A

Assignment #14

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CADCAM 2D

Key Concepts

Draw this portion - Then rotate! ⟵

To establish this point ⟵
Draw a line from the origin
Length=4.229, Angle=22.5
Place the 1.329R circle at the tip of this line.

Create a vertical Line
X coordinate = .125
Create a vertical Line
X coordinate = -.125
Create a horizontal Line
Y coordinate = 1/2+3/16 (.6875)

1/4" KEYWAY 3/16" DEEP

R 1.329

45°

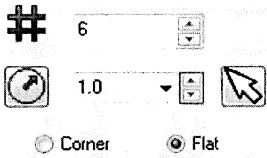4.229

0.500

XO,YO

R 3.25

R 0.500

1.650
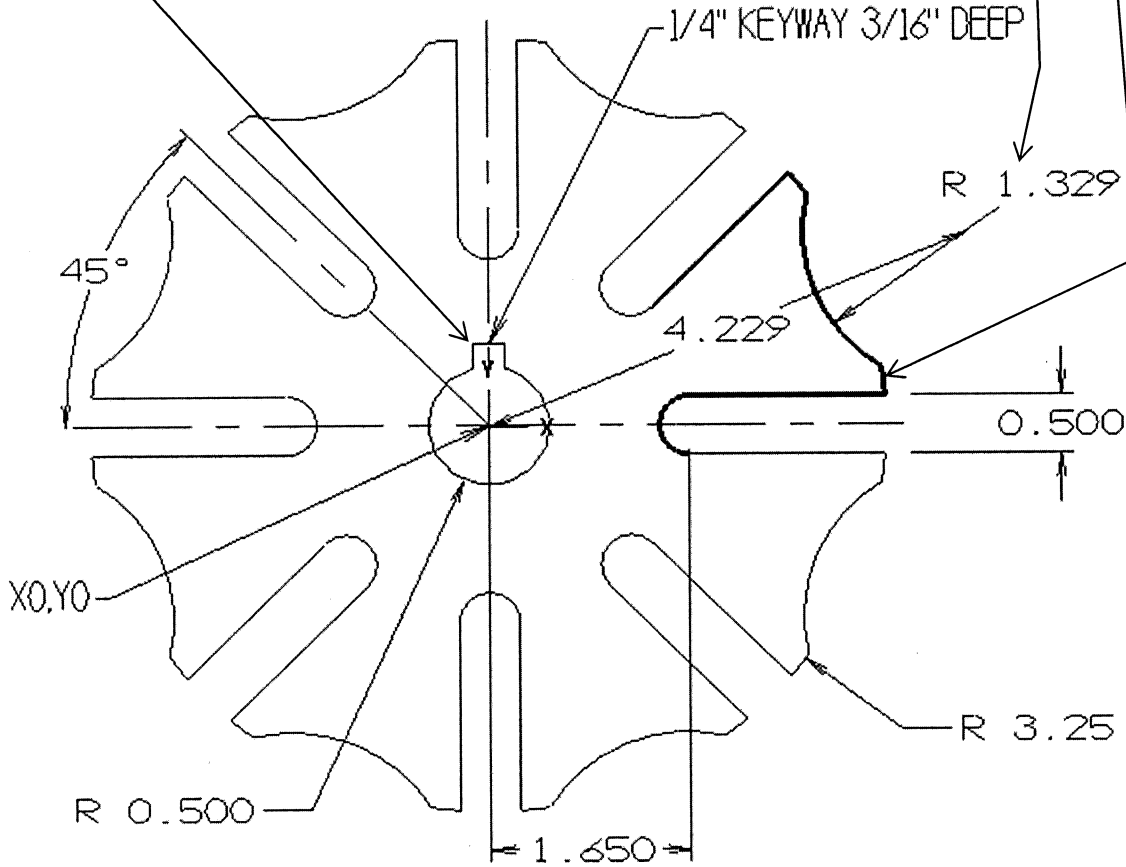
Assignment #15

Pikes Peak Community College

CADCAM 2D

Key Concepts
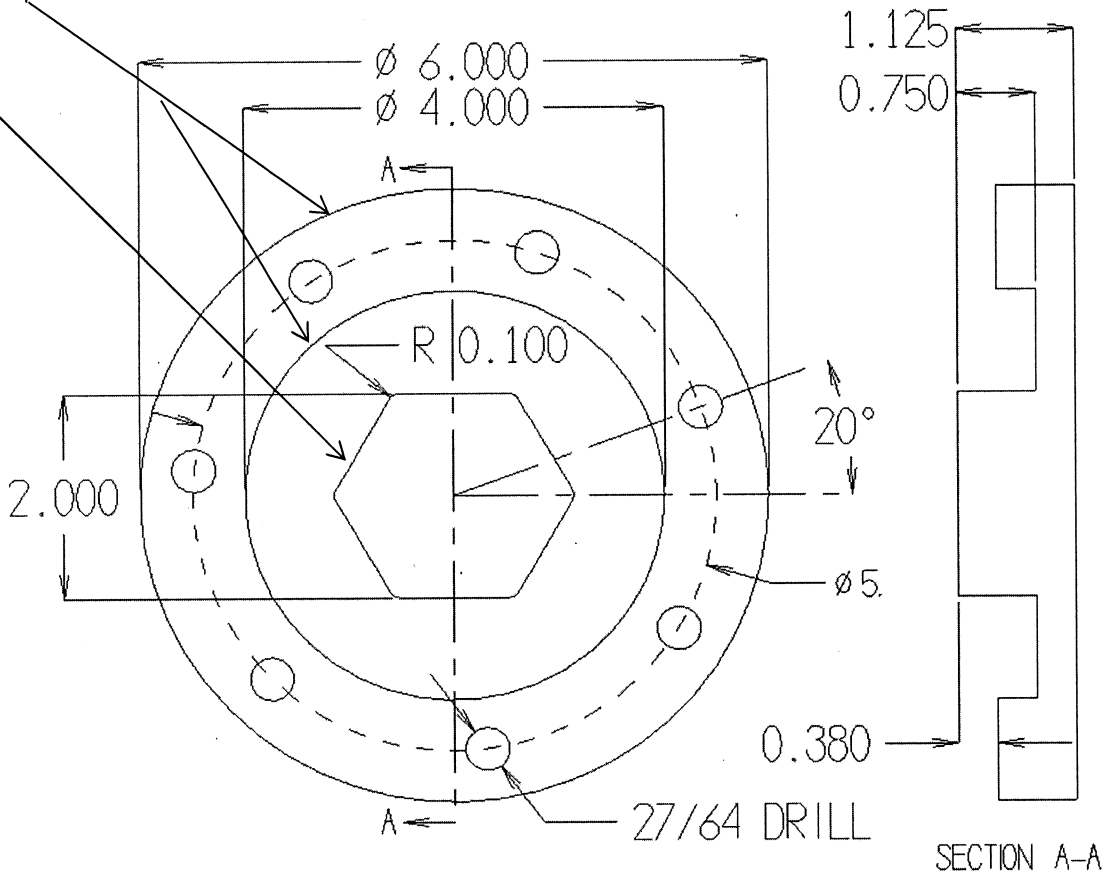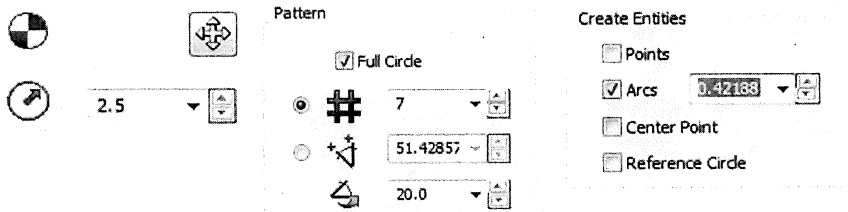
⬠ ˅ Create the polygon, set the number of sides to 6, and radius at 16

To calculate how much the polygon needs to be rotated. We draw
two lines and use that angle created between them as our rotation angle.
Create a line between the center of the 94" Radius and the center of the
25" Radius

Next, create a line vertical up from the center of the 25"Radius

Now rotate the polygon, you will need
to define the center point as the center
of the 25" Radius. ⟶
Right click on the angle box, choose
angle menu, and 2 lines
Select the two lines drawn above,
(Be sure to choose the left one first)

| Define |
| Center |
| Point. |

339.61702 ▾

⊙ Rotate   ◯ Translate

R 94.000

R 25.000

R 25.000

R 19.000

32.000

Y

X

XO,YO

∅ 22.000

Note: this polygon is set
at a 90 degree angle in
relationship to the 94"
Radius

62.000

Fillets or Arc Tangent

Assignment #16

Pikes Peak Community College
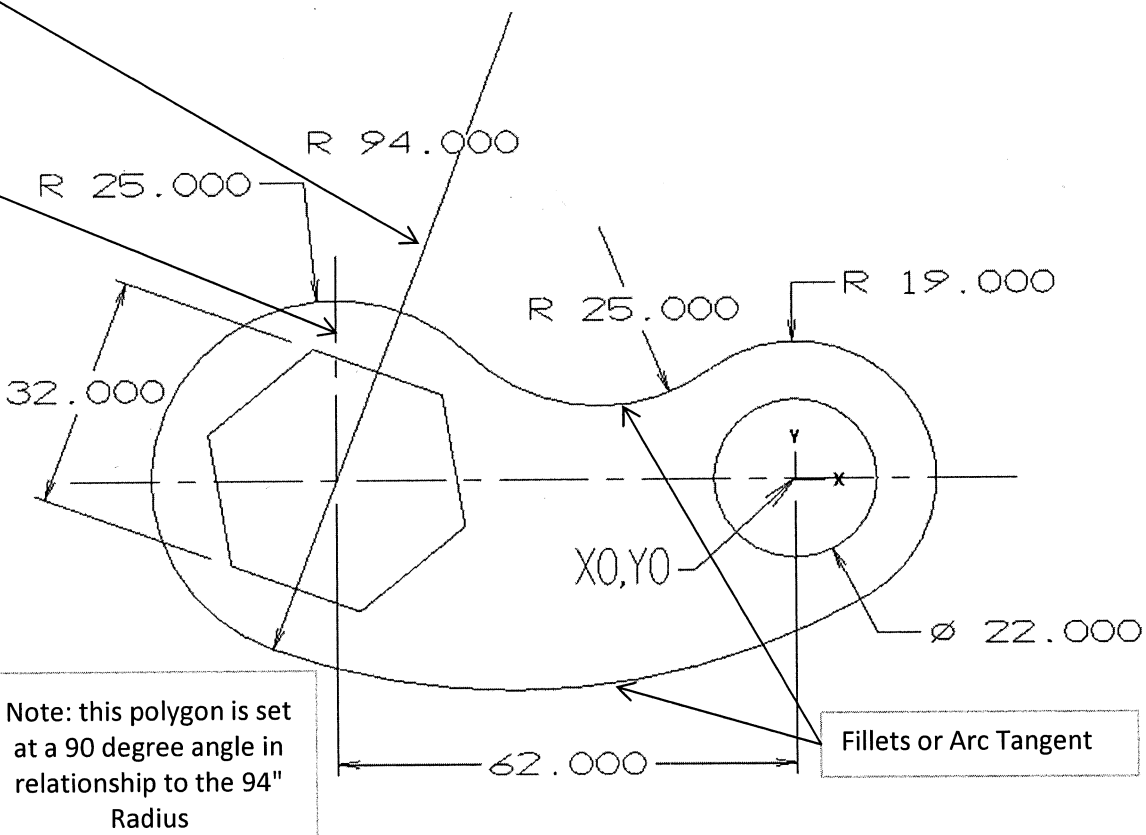
CADCAM 2D

Key Concepts

○ ▾ Create, (on the menu bar) Ellipse
Set Width to 5.625, Height to 1.5
Place at origin

| | 5.625 |
| 1.5 |
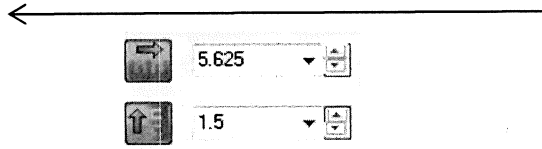
Draw a line between "A" and "B" points
Create, Ellipse
Right click on the width box
Click L=length of an entity
Select the line between "A" and "B"
Now divide this number by 2 (Result = 1.4375)
Set the Height to .5
Place the ellipse at the middle of the line between "A" and "B"

| | 1.4375 |
| 0.5 |
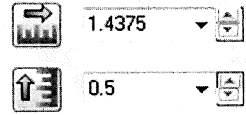
To clean up the drawing you will need to trim as well
as break and delete.

R 1.500

Ø 0.625

Y
X

A   B

R 0.625

X0,Y0

1.750

5.000
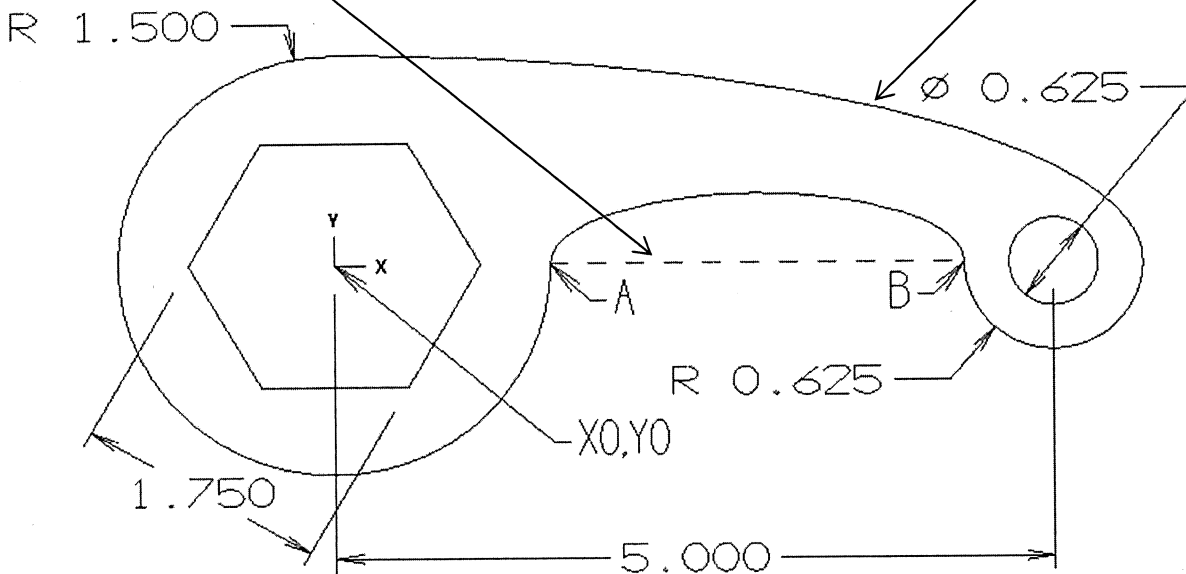
Assignment #17
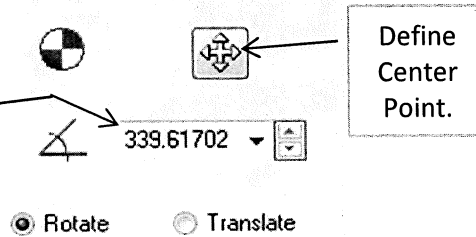
Pikes Peak Community College

CADCAM 2D

Key Concepts

- Create Line
  Angle= 135 Length= 2.375
  Place .25 Diameter circles on the end of the line.

- Rotate. Angle = (360-90)/# of holes

Note: 19 holes are D .250
equally spaced

3.000

R .250 TYP

45°

R .375

Ø.375

R 1.406

R 4.0

0.500

XO,YO

R 1. TYP

0.500

Ø.25

R.25

2.25

R .250
3 PLACES

R 2.625
R 2.375
R 2.125

To plot these points. Draw a vertical
line down the Y axis. Then parallel over
2.25/2

Assignment #18

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CADCAM 2D

Key Concepts

First create the hole indicated
X Form Rectangular Array
Set the values as shown to the
right.

Try rotating a single set of holes
around the center of the part.

Direction 1

\# 8

0.75

0.0

Direction 2

\# 8

0.75

90.0

.750 TYP

.750 TYP

Ø 0.250

R.1
4 PLACES

15.000

.750 TYP

.750 TYP

X0,Y0

.750 TYP

15.000

Assignment #19

Pikes Peak Community College
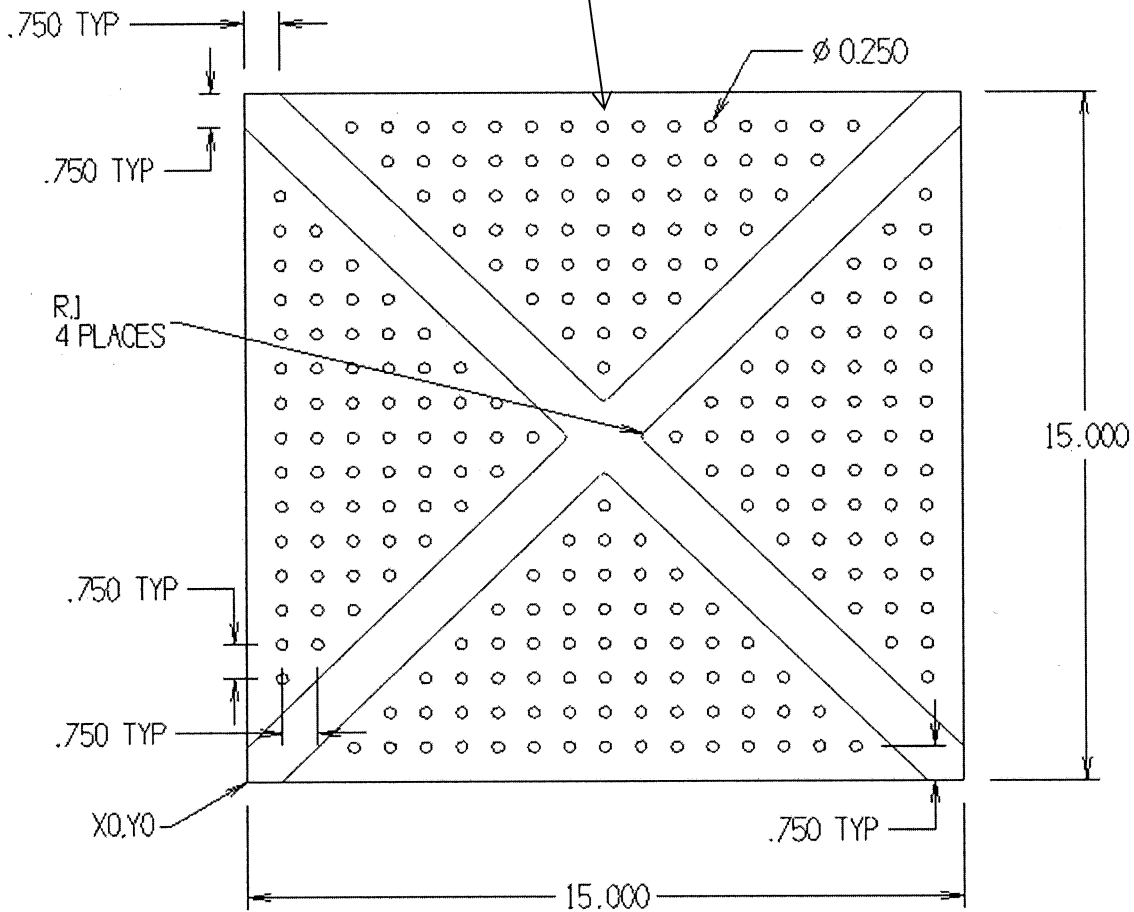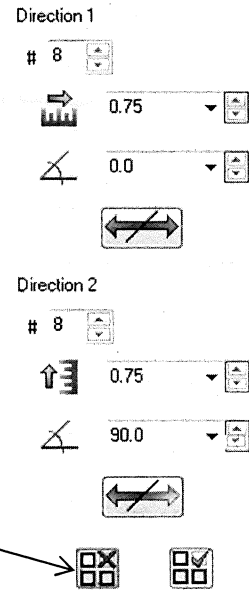
CADCAM 2D

Key Concepts

- ✎ ▾ Create Line from the origin ←─────────────────────
  Length = 2.125
  Angle = 0 Degrees
- ✎ ▾ Create Line from the origin ←─────────────
  Length = 2.125
  Angle = 10 Degrees

- ✎ ▾ Create a line between the two intersecting points where the above lines meet the 2.125" and the 2" circles

- ▦ Rotate 36 times around the origin.(be careful not to create duplicates)

R 0.125 TYP

R 2.000

R 2.125

R 0.250

R 1.75

R 0.500

XO,YO

Ø 0.500

R 0.500

5° TYP
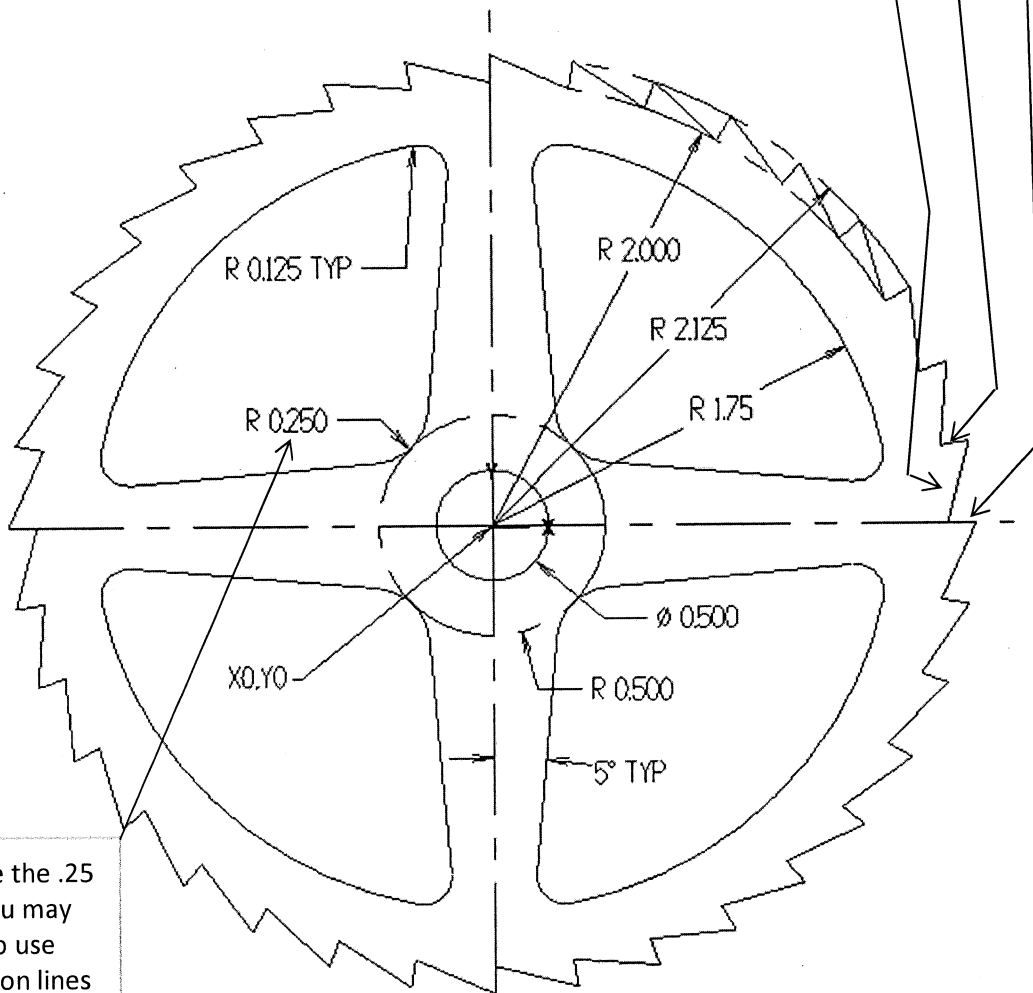
First place the .25 circle(you may need to use construction lines to do this), then create tangent lines 5 degrees off vertical.

Assignment #20

Pikes Peak Community College

CADCAM 2D

Key Concepts

Create a rectangle centered over the origin.
Width = 6.45
Height = 4

For Chamfers:
Create, (on the menu bar) Chamfer entities
Chamfers work like fillets.   2 Distances

For Misc. locations use parallel lines

Arc tangent   To a point.
Note: This is a very handy approach to creating circles - Practice It!!
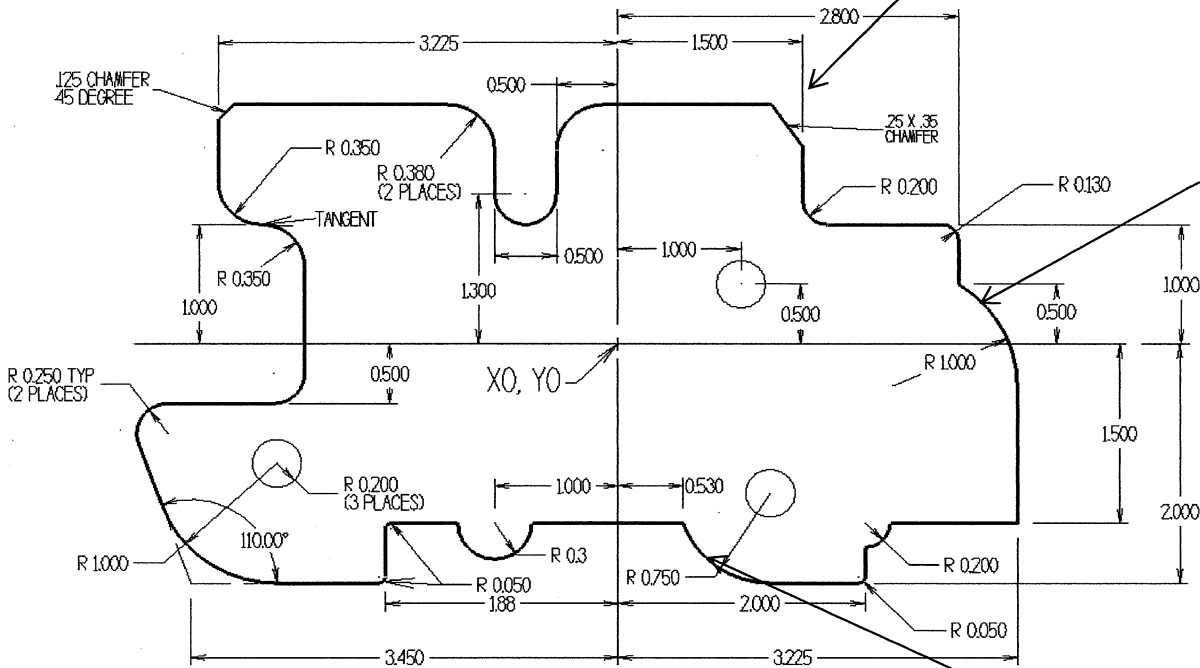
Assignment #21

Pikes Peak Community College

CADCAM 2D

Key Concepts

◁ ▾ Create, Arc, Tangent   3 entities   ←
     NOTE: The 3rd entity is a vertical line drawn at X -.856

◁ ▾ Create, Arc, Tangent   2 entities   ←

→ Create, Line from Origin at 100 degrees
Then Parallel, side distance 1.710

→ Create, Line from Origin at 130 degrees
Then Parallel, side distance 2.027

40°
0.800
R 0.230
R 0.420
R 0.360
2.027
2.000
1.973
R 2.600
R 1.000
R 1.500
0.600
R .090 (2 PLACES)
10°
X0,Y0
2.000
R 0.500
0.856
1.100
R .200 RADIUS
1.710
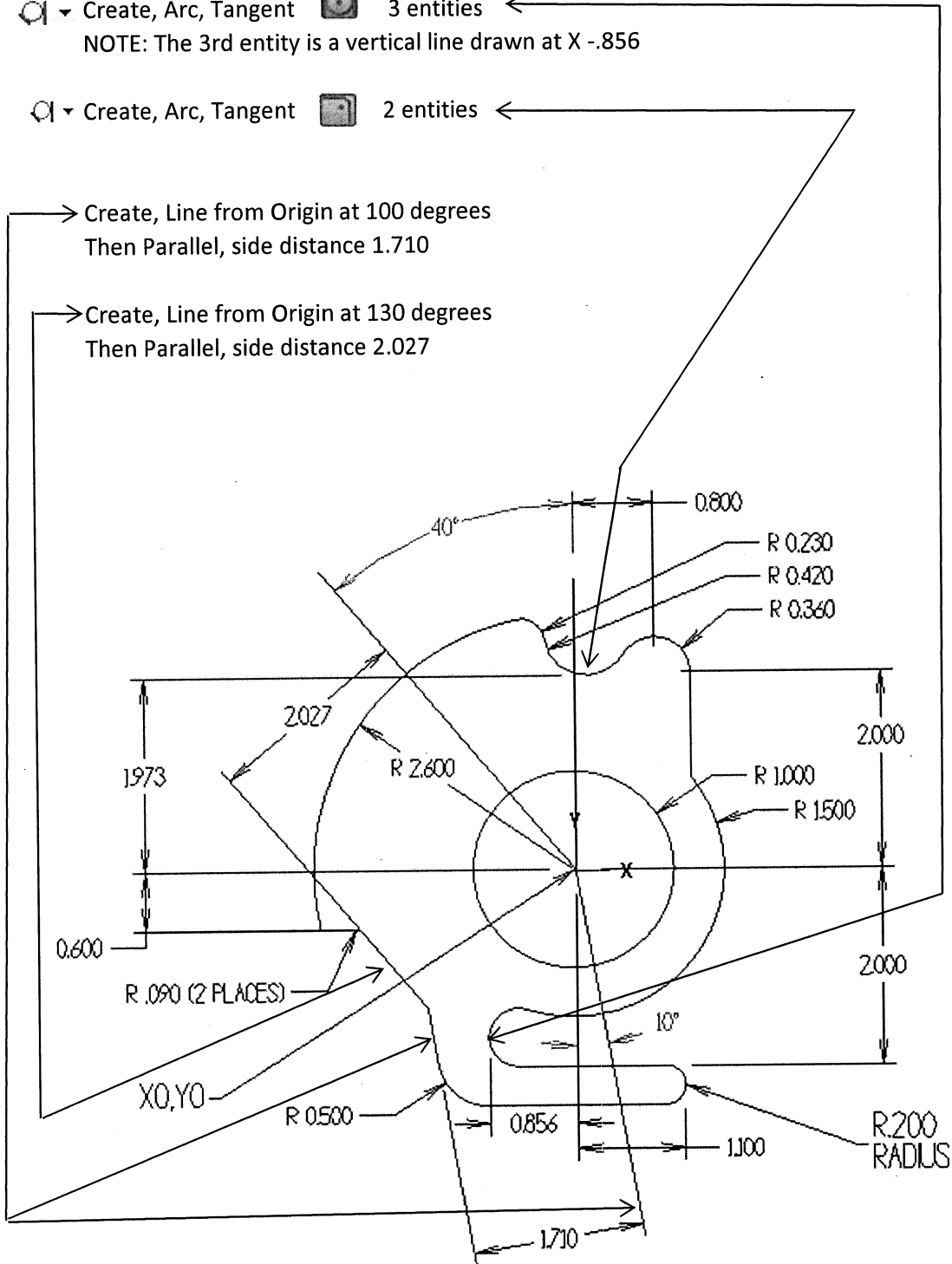
Assignment #22

Pikes Peak Community College

CADCAM 2D

Key Concepts

- ➤ Create, Line Angle= -100 Degrees
  (This Line must begin at the intersection of the 1.125 circle, and the .625 Dimension)

- ➤ Arc Tangent ⬛ 2 Entities ←
  (Tangent to the 10 Degree line and a parallel line you create based on the .425 dimension)

- ➤ Create, Line, ⬛ Tangent ←
  Angle = 70 Degrees

10°

20°

Ø 0.900

R 1.125

0.625

0.425

30°

1.125

1.500

R 0.500

R 0.688

XO,YO

R 1.375

	Arc Tangent ⬛
◁ ▾	2 Entities
	(The D .9 circle and the bottom line)
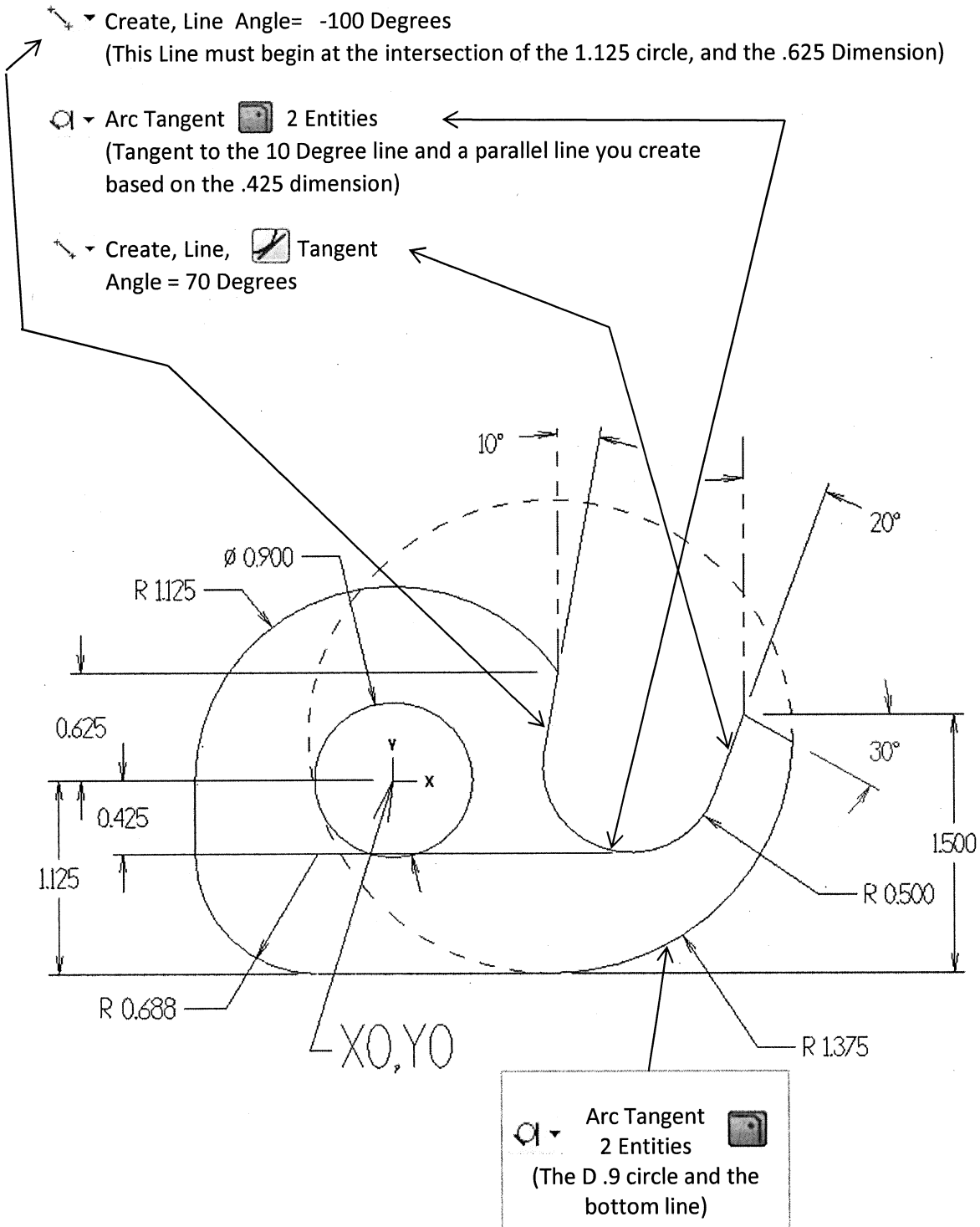
Assignment #23

Pikes Peak Community College

CADCAM 2D

Key Concepts

⌐↖ ▾ Line ⟋ Tangent - the two arcs

Note: In order to find the center for these holes, create a circle tangent to both lines then create a line from the Origin to the center of this circle.

Also try Mirroring these circles across the X axis.

⟲ ▾

Arc tangent to two or three entities.

1.000 TYP

Ø 0.125

Ø 0.225

NOTE: ALL HOLES CENTERED ON FEATURE

R 2.380

R 2.120

1.000

Ø 0.325

Ø 0.425

0.625

XO,YO

R 0.060

0.140

R 0.500

5.500

Assignment #24

Pikes Peak Community College

CADCAM 2D

Key Concepts

- Create Line, ▨ Fast Point = 1.5,1.5
  Length - 4", Angle - 63 Degrees

  For the .25 R holes
  Create a R 1.677 circle at the top end of the above line,
  and a R2.610 circle at the bottom end of the above line.
  Place the R.25 circles at the intersections of the two circles.
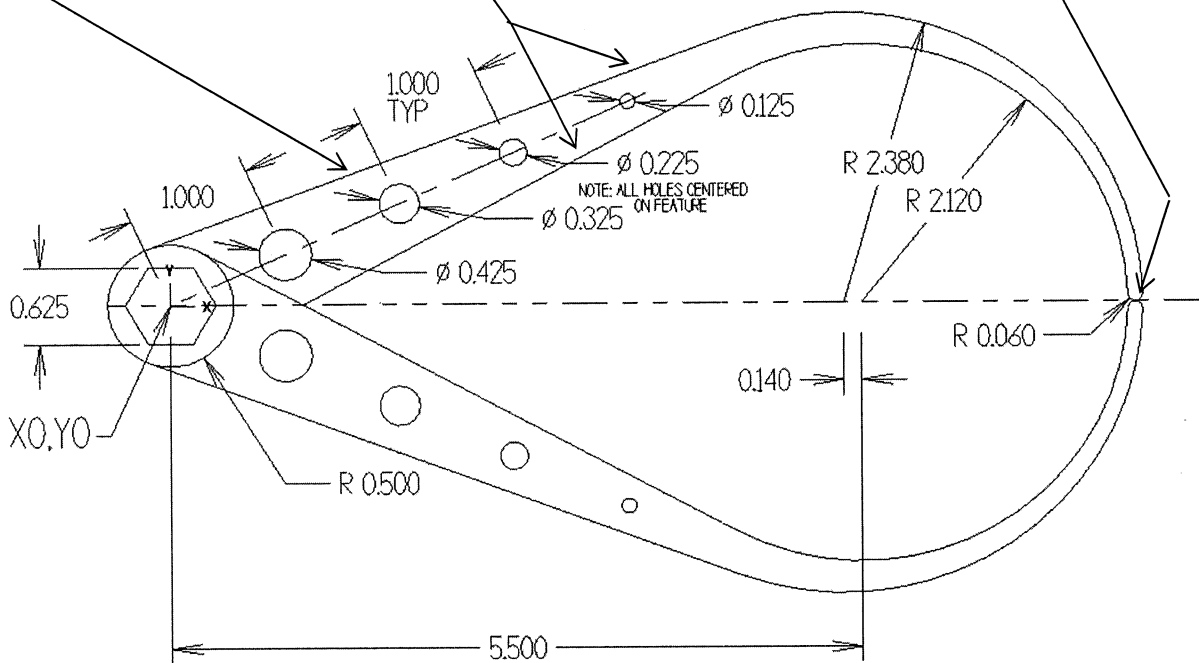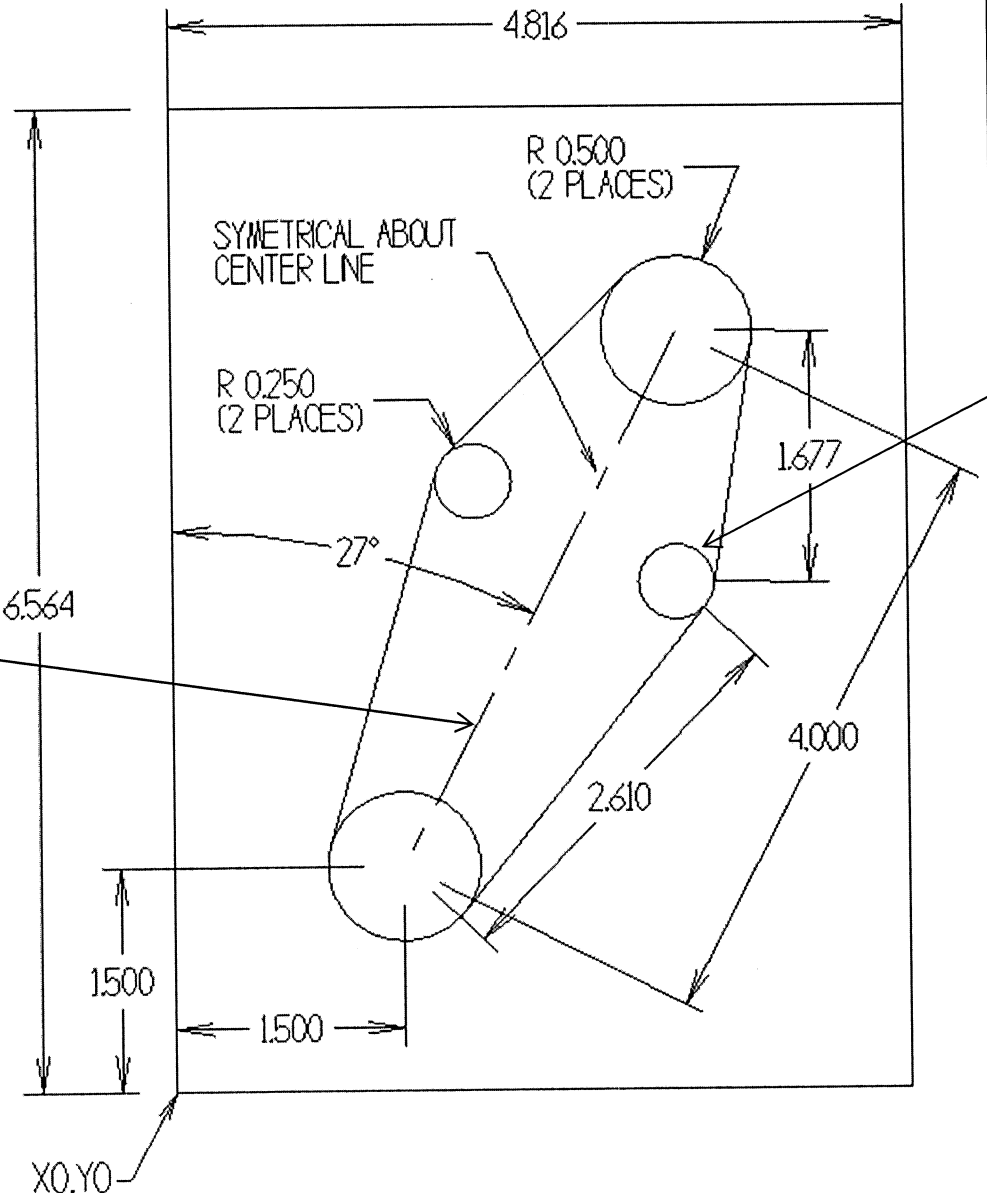

Assignment #25

Pikes Peak Community College

CADCAM 2D

◇ ▾ Create, Polygon. Place at origin

✎ ▾ Create, Line. 60, & 135 Degrees

45°   30°

R 0.625
(3 PLACES)

R 3.075

R 3.75   R .250
TYP

Ø .0.750
(2 PLACES)

R 1.200

R 1.625

R 3.125

FILLET

0.750   XO,YO
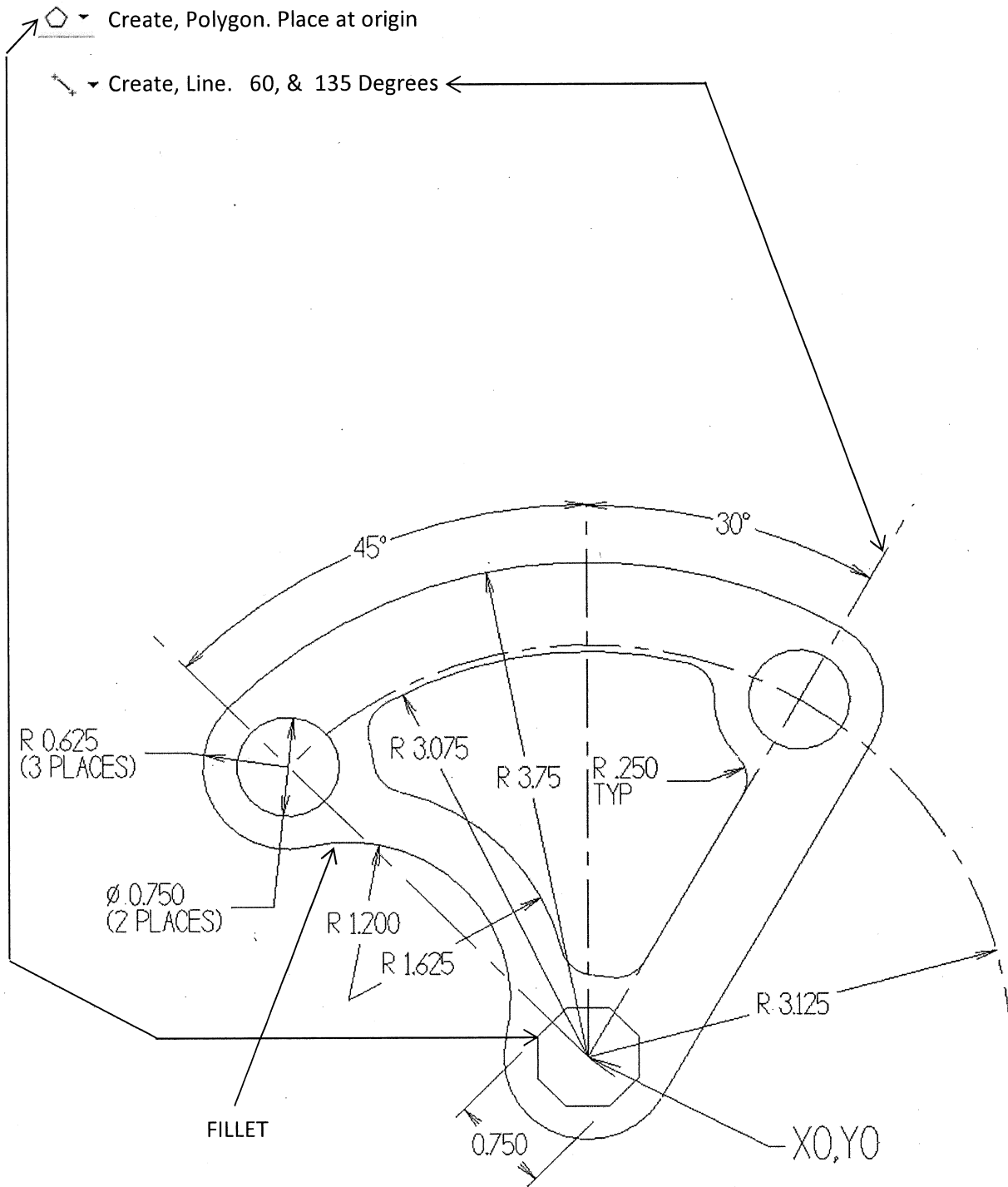
Assignment #26

Pikes Peak Community College

CADCAM 2D

Key Concepts

○ ▾ Create, (on the menu bar) Ellipse ⟵
  X Radius = 3.75   Y Radius = 2.5   Place on Origin

○ ▾ 2nd Ellipse ⟵
  X Radius = 3.45   Y Radius = 2.2   Place on Origin

Assignment #27

Pikes Peak Community College
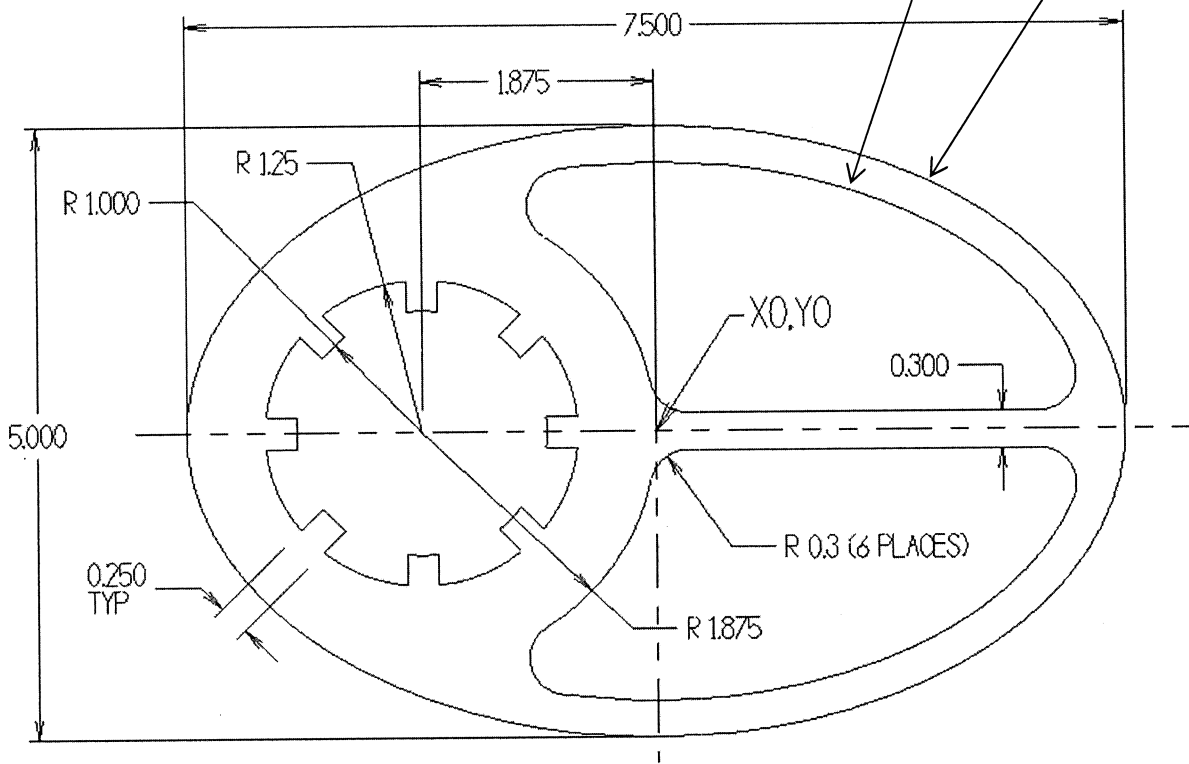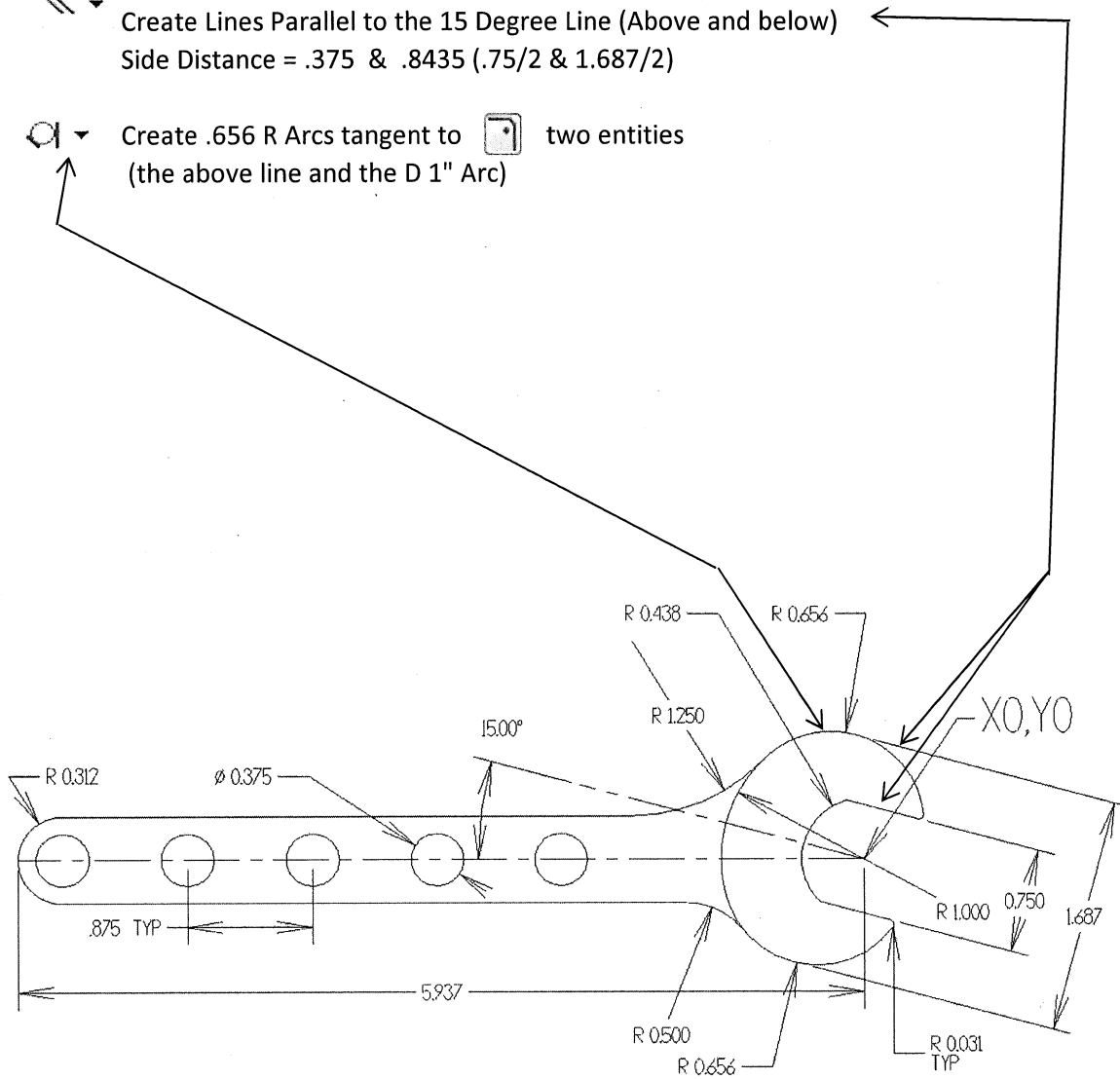
CADCAM 2D

Key Concepts

Create the R .438 Circle - From Origin
Create the R 1.00 Circle - From Origin
Create a -15 Degree Line - From Origin

To make the jaws of the wrench;
Create Lines Parallel to the 15 Degree Line (Above and below)
Side Distance = .375 & .8435 (.75/2 & 1.687/2)

Create .656 R Arcs tangent to   two entities
(the above line and the D 1" Arc)

R 0.438   R 0.656

R 1.250

15.00°   XO,YO

R 0.312   Ø 0.375

R 1.000   0.750
                              1.687
.875 TYP

5.937
                R 0.500
                                        R 0.031
           R 0.656   TYP

Assignment #28

Pikes Peak Community College

CADCAM 2D

Key Concepts

Create line - Angle = 320, (or -40)

Create line perpendicular
one to the 40 degree line, and one to both 15 degree lines.

50 deg

R 1.000

40°

R .750
(3 PLACES)

15°

2500

6.000

R 0.125

90°

90°

4.000

15°

X0,Y0

4.000

6.000

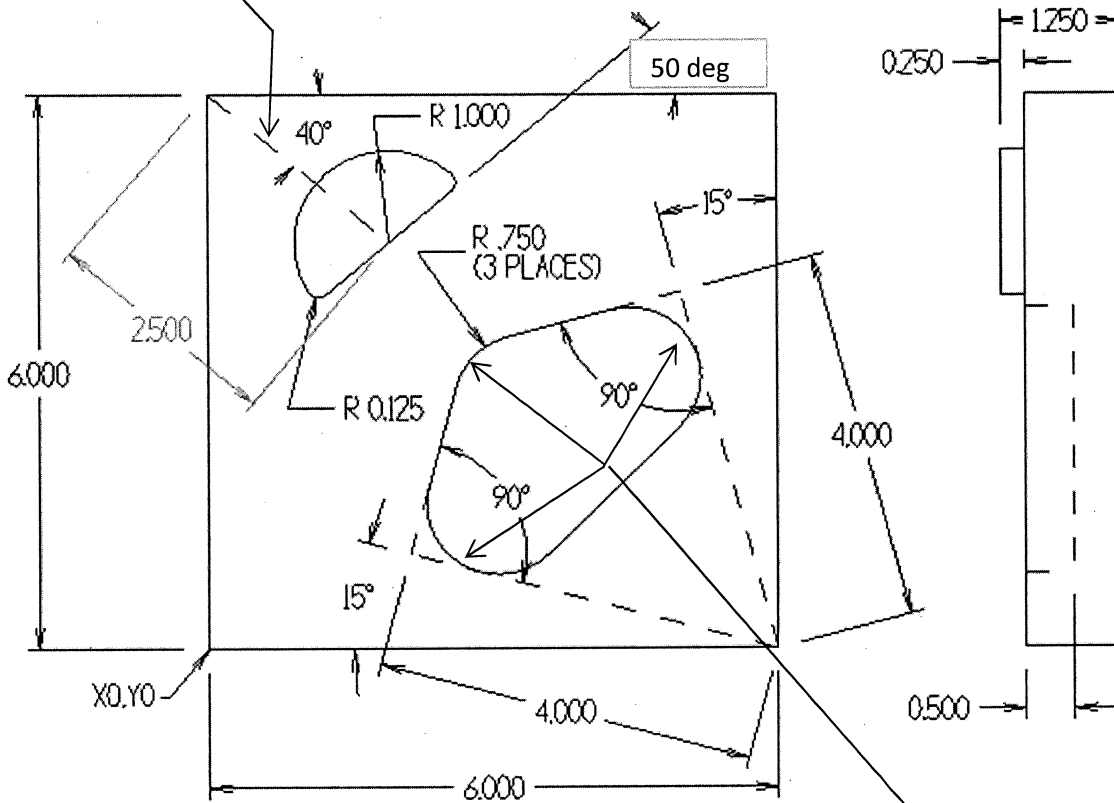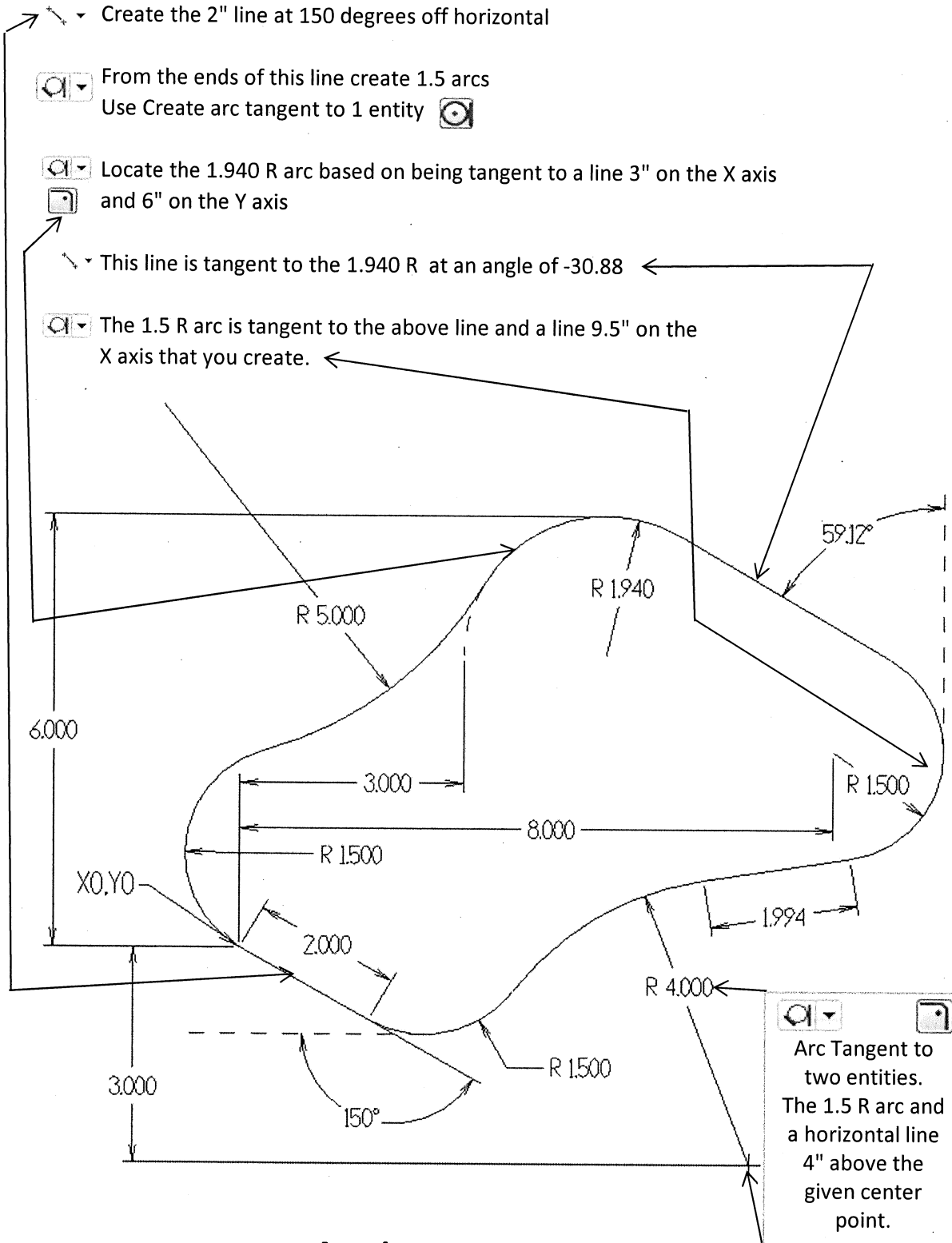1.250

0.250

4.000

0.500

Fillet or Arc Tangent
two entities.

Assignment #29

Pikes Peak Community College

CADCAM 2D

Key Concepts

- Create the 2" line at 150 degrees off horizontal

- From the ends of this line create 1.5 arcs
  Use Create arc tangent to 1 entity

- Locate the 1.940 R arc based on being tangent to a line 3" on the X axis
  and 6" on the Y axis

- This line is tangent to the 1.940 R at an angle of -30.88 ⟵

- The 1.5 R arc is tangent to the above line and a line 9.5" on the
  X axis that you create. ⟵

59.12°

R 1.940

R 5.000

6.000

3.000

R 1.500

8.000

R 1.500

X0,Y0

2.000

1.994

3.000

150°

R 1.500

R 4.000 ⟵

Arc Tangent to
two entities.
The 1.5 R arc and
a horizontal line
4" above the
given center
point.

Assignment #30

Pikes Peak Community College