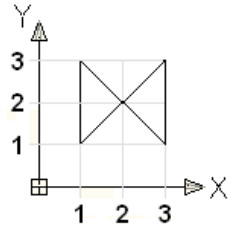
ENG103 – Computer Aided Design
Lecture Set II

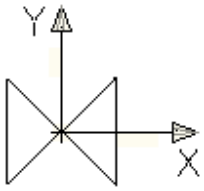
Coordinate System

It is possible to change origin (0,0 point) of coordinate system that you are currently using. Origin can be altered relative to current origin. Let's draw a simple figure first (shown below) and then play with it's origin .

line↵
1,1↵
2,2↵
0,-2↵
-2,2↵
0,-2↵

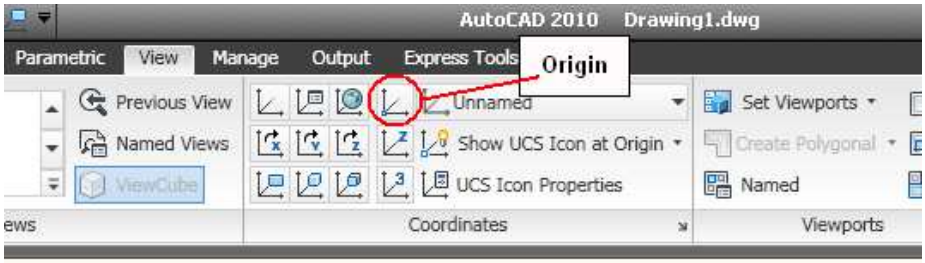


By changing origin we can set middle of whole drawing to the origin as shown below.



In order to do that, you'll either choose 'Origin' icon from 'View' menu or write command,

ucs↵
o↵



New origin point will be asked as,

```
Specify new origin point <0,0,0>:
```

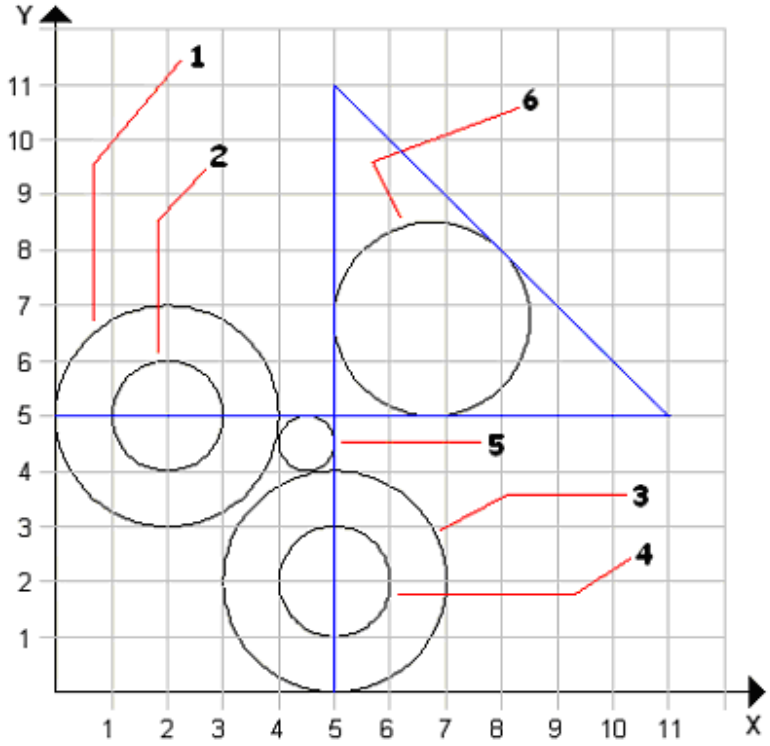
Here we have to enter three values for X,Y and Z. As far as we are dealing with 2D coordinate system Z can be given as 0. So, if we just enter 2,2,0, middle of our drawing will be at origin.

CIRCLE Tool Command

The command for circle is '**CIRCLE**' or '**C**'. It is possible to draw a circle with one of the six methods. These are,

1. Center, Radius
2. Center, Diameter
3. 2 Point
4. 3 Point
5. Tan, Tan, Radius
6. Tan, Tan, Tan

Following drawing will be used to illustrate all methods.



Before drawing circles, let's draw our lines using 'Relative Absolute co-ordinate entry'.

LINE↵
0,5↵
11,0↵
-6,6↵
0,-11↵

After drawing our lines we can continue with circles.

1. Center, Radius. Circle can be drawn by determining center and then radius.

circle↵
2,5↵
2↵

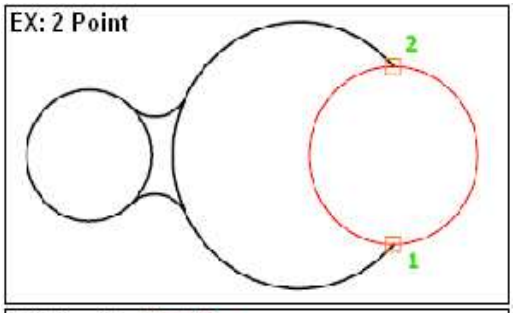
2. Center, Diameter. Circle can be drawn by determining center and then diameter. But, in between 'd' letter must be entered to determine that diameter will be used.

circle↵
2,5↵
d↵
2↵

3. 2 Point. Circle can be drawn by determining touch points of it's diameter line.

circle↵		circle↵
2p↵	OR	2p↵
5,4↵		5,4↵
#5,0↵		@0,-4↵

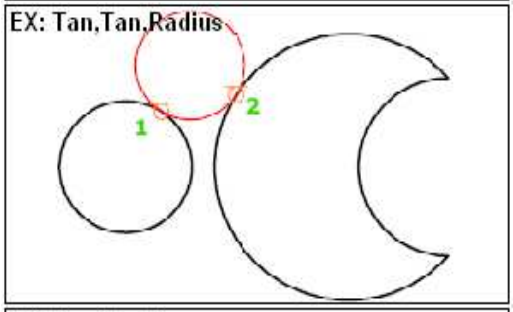
(There is NO need for '@' sign)



4. 3 Point. Circle touches three determined point.

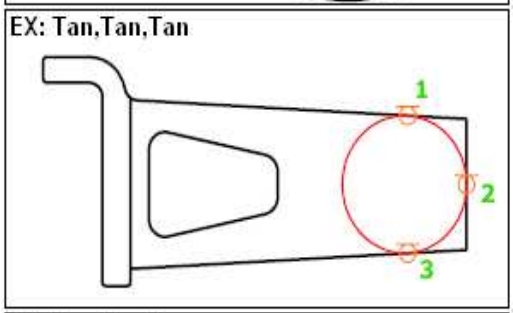
circle↵		circle↵
3p↵		3p↵
5,3↵	OR	5,3↵
#5,1↵		@0,-2↵
#6,2↵		@1,1↵

(There is NO need for '@' sign)



5. Tan, Tan, Radius. Circle touches to two tangent lines with a given radius. Mouse must be used to choose tangent lines and radius is given from keyboard.

circle↵
ttr↵
<choose first tangent line>
<choose second tangent line>
0.5↵

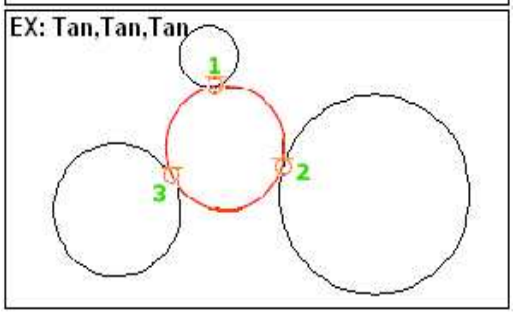


6. Tan, Tan, Tan. Circle touches to three tangent lines. Directly choose from menu "circle → tan, tan, tan" then choose three tangent lines.

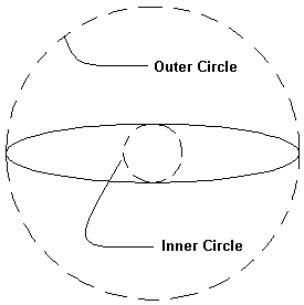
OR

It is possible to do the same thing with command line as,

c↵ 3p↵ tan↵ <choose line> tan↵ <choose line> tan↵ <choose line>

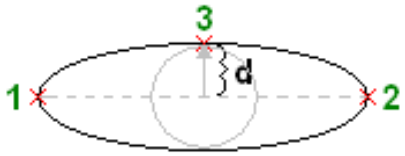


ELLIPSE Tool Command



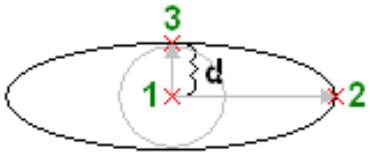
The command for ellipse is '**ELLIPSE**' or '**EL**'. It is possible to draw an ellipse with one of the two methods. These are "Axis, End" and "Center" methods. In fact an ellipse can be defined using two circles,

1. Axis, End. First two points creates axis of ellipse and third point is a coordinate (or distance) from center of ellipse (or from middle point of axis) for the inner circle.



First two entries defines diameter (and also slope of ellipse) of outer circle. Both circles are using the same center so last entry just defines radius of inner circle.

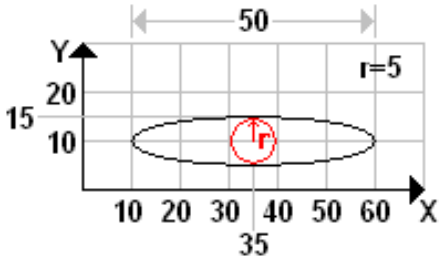
2. Center. First point is the center of ellipse, second point is used to obtain axis and third point is a coordinate (or distance) from center of ellipse for the inner circle.



First two entries defines center and radius (also slope of ellipse) of outer circle and third entry is exactly the same as previous method.

Notice: While determining third point for both methods, either distance from center or a coordinate, for the invisible inner circle, will be given. If a coordinate is given, the distance between center and that point will be taken as radius of inner circle.

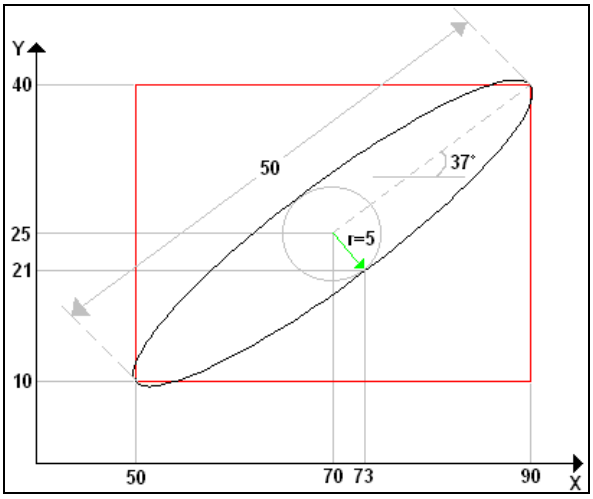
Let's start with a very simple example using 'Axis, End Method'.



el↵
10,10↵
#60,10↵ **OR** @50,0↵ **OR** 50<0↵
5↵ **OR** #35,15↵ **OR** #35,5↵ **OR** @0,5↵ **OR** @0,-5↵

Let's try to draw given ellipse (below) with both methods. Before drawing ellipses it will be better to draw rectangle (drawn with red color) using 'line' command.

line↵
50,10↵
40,0↵
0,30↵
-40,0↵
c↵



1. Axis, End Method

el↵
50,10↵
#90,40↵ **OR** @40,30↵ **OR** 50<37↵
5↵ **OR** #73,21↵ **OR** #67,29↵ **OR** @3,4↵

(Note that, there is no need to write '@' sign as far as it is default)

2. Center Method

el↵
c↵
70,25↵
#90,40↵ **OR** @20,15↵ **OR** 25<37↵
5↵ **OR** #73,21↵ **OR** #67,29↵ **OR** @3,4↵

(Again, there is no need to enter '@' sign)