1. Write a program to implement mid-point Circle Drawing Algorithm.

***Algorithm:***

1. Given, center *(x1, y1)* and radius *r.*
2. Obtain the first point on the circumference of the circle centered on the origin as:  
   *(x0, y0) = (0, r)  
   i.e., x = 0, y = r*
3. Calculate the initial decision parameter as:  
   If *r* is a floating point, *P0 = (5/4) – r*Else, *P0 = 1 – r*
4. At each *xk* position, starting at *k = 0* perform the following test:If *Pk < 0* (the next point along the circle centered on (0, 0)),  
   a) Plot (xk + 1, yk)  
   b) Pk + 1 = Pk + 2xk + 1 + 1  
   Else,   
   a) Plot (xk + 1, yk – 1)  
   b) Pk + 1 = Pk + 2xk + 1 – 2yk + 1 + 1
5. Determine the symmetric points to other seven octants:  
   *(x, -y), (-x, y), (-x, -y), (y, x), (y, -x), (-y, x) and (-y, -x)*
6. Move each calculated pixel position *(x, y),* onto the circular path centered on *(xc, yc)* and plot the coordinate values: *x = x + xc* and *y = y + yc.*
7. Repeat steps (iv) through (vi) until *x >= y*.
8. Write a Program to implement mid- point Ellipse Drawing Algorithm.

***Algorithm:***

1. Input *rx, ry* and the ellipse center *(xc, yc)* and obtain the first point on an ellipse centered on the origin as *(x0, y0) = (0, ry)*.
2. Calculate the initial value of decision parameter in region 1 as:
3. At each *xk* position in region 1 starting at *k = 0*, perform the following tests:

If *P1k < 0,*a) Plot (*xk + 1, yk)*b)   
Else,  
a) Plot (*xk, yk – 1)*b)   
with,   
,   
and continue until

1. Calculate the initial value of decision parameter in region 2 using the last point *(x0, y0)* calculated on region 1 as:
2. At each *yk* position in region 2, starting from *k = 0*, perform the following tests:  
   If *P2k < 0,*   
   a) Plot (*xk + 1, yk – 1)*b) Else,a) Plot (*xk, yk – 1)*b)
3. Using the same incremental calculations for *x* and *y* in region 1 continue until *y = 0*.
4. Determine the symmetric points in the other three quadrants:  
   *(-x, y), (-x, -y), (x, -y)*
5. Move each calculated pixel position *(x, y)* onto the elliptical path centered on *(xc, yc)* and plot the coordinate values.  
   *x = x + xc, y = y + yc*