SOURCE CODE

```
1.  import pygame
2.  import sys
3.
4.  def midpointEllipse(rx,ry,xc,yc):
5.      x = 0
6.      y = ry
7.      p1 = ry * ry - rx * rx * ry + 0.25 * rx * rx
8.      dx = 2 * ry * ry * x
9.      dy = 2 * rx * rx * y
10.     while(dx < dy):
11.         if(p1<0):
12.             x = x+1
13.             y= y
14.             p1 = p1+ dx + ry * ry
15.             dx = 2 * ry * ry * x
16.             dy = 2 * rx * rx * y
17.
18.         else:
19.             x = x+1
20.             y =y-1
21.             p1 = p1 + dx - dy + ry * ry
22.             dy = 2 * rx * rx * y
23.             dx = 2 * ry * ry * x
24.
25.
26.         screen.set_at((round(xc + x), round(yc + y)), WHITE)
27.         screen.set_at((round(xc - x), round(yc + y)), WHITE)
28.         screen.set_at((round(xc + x), round(yc - y)), WHITE)
29.         screen.set_at((round(xc - x), round(yc - y)), WHITE)
30.
31.     p2 = ry * ry* (x+ 0.5) * (x+0.5) + rx*rx*(y-1)*(y-1)-rx*rx*ry*ry
32.
33.     while(y!=0):
34.         if(p2>0):
35.             x = x
36.             y = y-1
37.             p2 = p2 + rx * rx - dy
38.             dy = 2 * rx * rx * y
39.             dx = 2 * ry * ry * x
40.
41.         else:
42.             x = x+1
43.             y = y-1
44.             p2 = p2 + dx - dy + rx * rx
45.             dy = 2 * rx * rx * y
46.             dx = 2 * ry * ry * x
47.
48.         screen.set_at((round(xc + x), round(yc + y)), WHITE)
49.         screen.set_at((round(xc - x), round(yc + y)), WHITE)
50.         screen.set_at((round(xc + x), round(yc - y)), WHITE)
51.         screen.set_at((round(xc - x), round(yc - y)), WHITE)
52.
53.
54. pygame.init()
55. WIDTH = 800
56. HEIGHT = 600
57.
58. screen = pygame.display.set_mode((WIDTH, HEIGHT))
```

```
59.
60. pygame.display.set_caption("Midpoint Ellipse Algorithm")
61.
62. WHITE = (255, 255, 255)
63. BLACK = (0, 0, 0)
64.
65. def main():
66.     while True:
67.         for event in pygame.event.get():
68.             if event.type==pygame.QUIT:
69.                 pygame.quit()
70.                 sys.exit()
71.         screen.fill(BLACK)
72.         midpointEllipse(160, 130, 400, 300)
73.
74.         pygame.display.flip()
75.         pygame.time.delay(100)
76.
77. if __name__ == "__main__":
78.     main()
```

OUTPUT

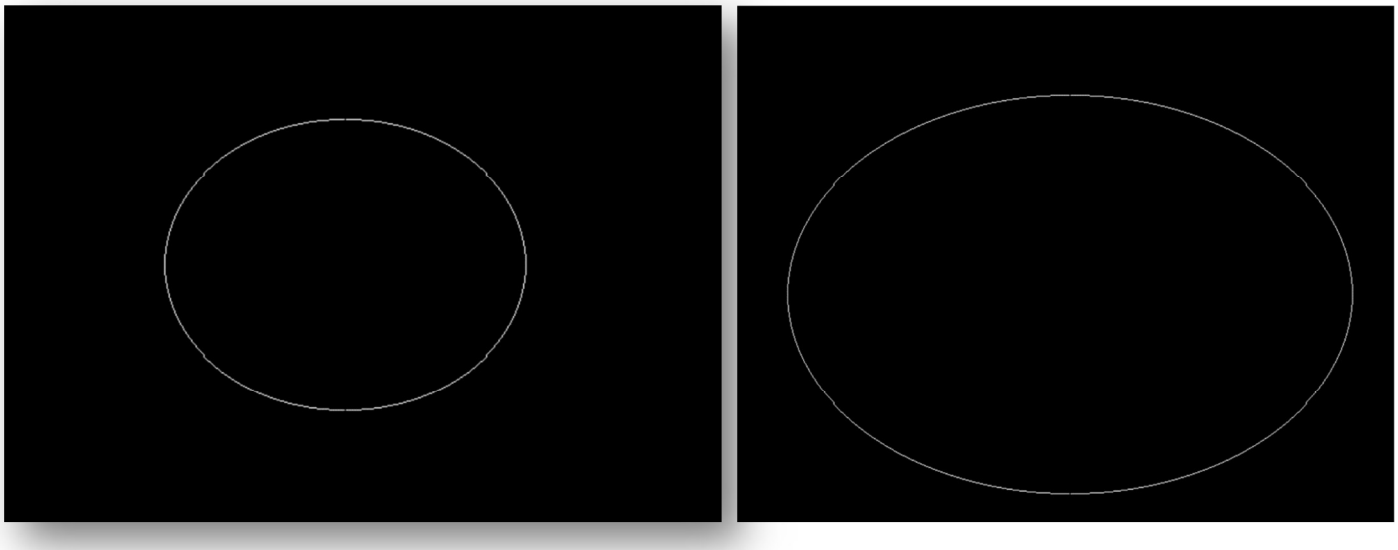

Fig. 6.1: Output of Midpoint Ellipse Algorithm