

Circle Drawing Algorithm using Mid-Point Method

If $p_k < 0$: $(x_k + 1, y_k)$ & $p_{k+1} = p_k + 2x_{k+1} + 1$

Else: $(x_k + 1, y_k - 1)$ & $p_{k+1} = p_k + 2x_{k+1} + 1 - 2y_{k+1}$

Repeat steps 3 though 5 until $x \geq y$.

K	P _k	(x _{k+1} , y _{k+1})	2 x _{k+1}	2 y _{k+1}
0	-7	(1, 8)	2	16
1	-4	(2, 8)	4	16
2	1	(3, 7)	6	14
3	-6	(4, 7)	8	14
4	3	(5, 6)	10	12
5	2	(6, 5)	12	10

Take the circle center as (0, 0) with radius 8, and starting point as (0, 8)

$p_0 = 1 - r = -7$, plot the initial point (0, 8), next point: (1, 8), $p_1 = -7 + 2 + 1 = -4$

$p_1 = -4$, plot the next point as (2, 8), $p_2 = -4 + 4 + 1 = 1$

$p_2 = 1$, plot the next point as (3, 7), $p_3 = 1 + 6 + 1 - 14 = -6$

$p_3 = -6$, plot the next point as (4, 7), $p_4 = -6 + 8 + 1 = 3$

$p_4 = 3$, plot the next point as (5, 6), $p_5 = 3 + 10 + 1 - 12 = 2$

$p_5 = 2$, plot the next point as (6, 5) → Stop.

Oct 1	Oct 2	Oct 3	Oct 4	Oct 5	Oct 6	Oct 7	Oct 8
(0, 8)	(0, 8)	(0, -8)	(0, -8)	(8, 0)	(-8, 0)	(8, 0)	(-8, 0)
(-1, 8)	(1, 8)	(1, -8)	(-1, -8)	(8, 1)	(-8, 1)	(8, -1)	(-8, -1)
(-2, 8)	(2, 8)	(2, -8)	(-2, -8)	(8, 2)	(-8, 2)	(8, -2)	(-8, -2)
(-3, 7)	(3, 7)	(3, -7)	(-3, -7)	(7, 3)	(-7, 3)	(7, -3)	(-7, -3)
(-4, 7)	(4, 7)	(4, -7)	(-4, -7)	(7, 4)	(-7, 4)	(7, -4)	(-7, -4)
(-5, 6)	(5, 6)	(5, -6)	(-5, -6)	(6, 5)	(-6, 5)	(6, -5)	(-6, -5)
(-6, 5)	(6, 5)	(6, -5)	(-6, -5)	(5, 6)	(-5, 6)	(5, -6)	(-5, -6)

