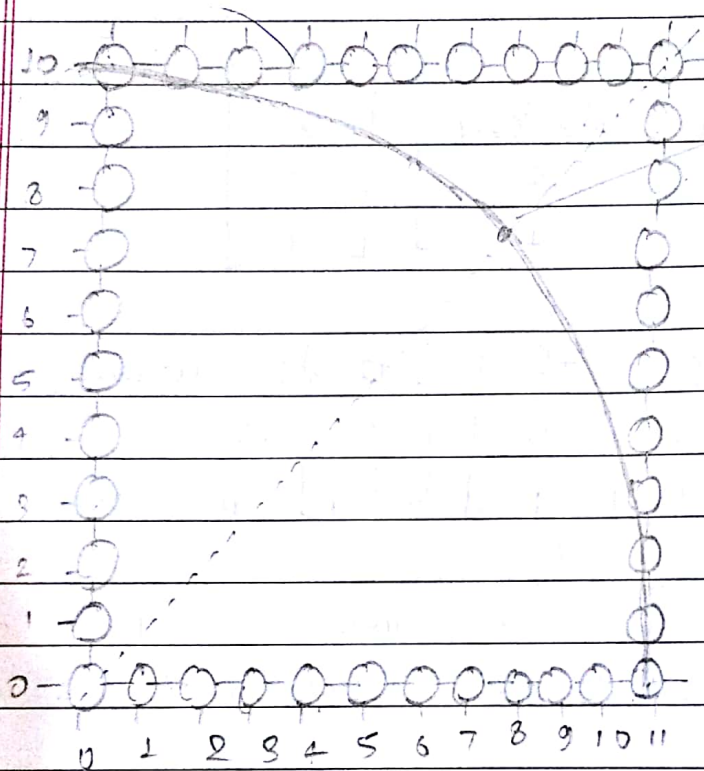Q. Find out all the pixel for the digital circle of radius 10 with center at origin.

→ calculations have need to be done till here only.

$$x_0, y_0$$
$$(0, 10)$$

$$p_0 = 1 - r = 1 - 10 = -9$$

when
$$p_k < 0$$

$$p_{k+1} = p_k + 2x_{k+1} + 1$$

or

when
$$p_k \geq 0$$

$$p_{k+1} = p_k + 2x_{k+1} + 1 - 2y_{k+1}$$

$x++ →$ always on x-axis
if sampling on x-axis

$$\left[y_{k+1} = y_k - 1 \right]$$

k	p_k	(x_{k+1}, y_{k+1})	$2x_{k+1}$	$2y_{k+1}$
0	-9	(1, 10)	2	20
1	-6	(2, 10)	4	20
2	-1	(3, 10)	6	20
3	6	4, 9	8	18
4	5-3	5, 9	10	18
5	8	6 8	12	16
6	5	7 7	14	14

Midpoint circle algorithm

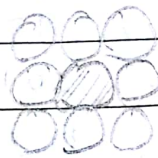- Eight way symmetry can hugely reduce the work to draw a circle.

Filled area primitives

- Solid colour or patterned polygon area.
- Polygons are easier to process since they have linear boundaries.
- There are two basic approaches for area filling.
- To determine the overlap intervals for scan lines that cross the area.
- To start from a given interior position & paint outward from this point until we encounter the specified boundary conditions.
- The scan line approach is typically used in general graphics packages to fill polygon circles, ellipses and other simple curves.
- All methods starting from an interior point are useful with more complex boundaries and in interactive painting systems.
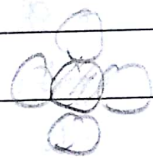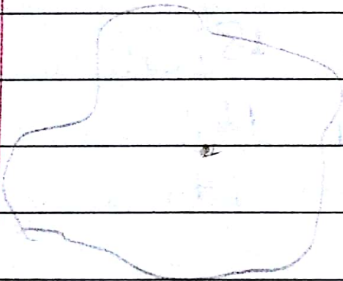
Filling algorithms
- Scan line
- Flood fill

8-neighbourhood   4-neighbourhood

x, y

$x+1, y$ $x+1, y+1$

$x-1, y$ $x+1, y-1$

$x, y+1$ $x-1, y+1$

$x, y-1$ $x-1, y-1$

lecture 15
MDU
28/02/18

Filled area primitives