Exercise 1

a)

b)

Scan Conversion is the process where the different polygons converted to pixels.

c)

Only a quarter of the circle needs to be specified. The quarter can be mirrored twice in order to calculated the complete circle.

The implicit function $F(x, y)$ for the given segment of the circle is the following

$$F(x, y) = x^2 + y^2 - r$$

where r is about 2.8 because the origin of the circle is in the middle and a complete quarter of the circle is given. The value of r is extracted of the picture.

1. Step *Initialize* d

$$\begin{aligned} d &= F(M) \\ &= F(x+1, y-\tfrac{1}{2}) \\ &= (x+1)^2 + (y-\tfrac{1}{2})^2 - r \end{aligned}$$

In the first step is $x_1 = 0$ and $y_1 = 3$. With $r = 2.8$, $d = 1^2 + (1.5)^2 - 2.8$, so $d = 0.45 > 0$. The algorithm chooses (E).

2. Step

$$\begin{aligned} d_{new} &= F(x_1 + 2, y_1 - \tfrac{3}{2}) \\ &= 2^2 + 0.5^2 - 2.8 \\ &= \end{aligned}$$