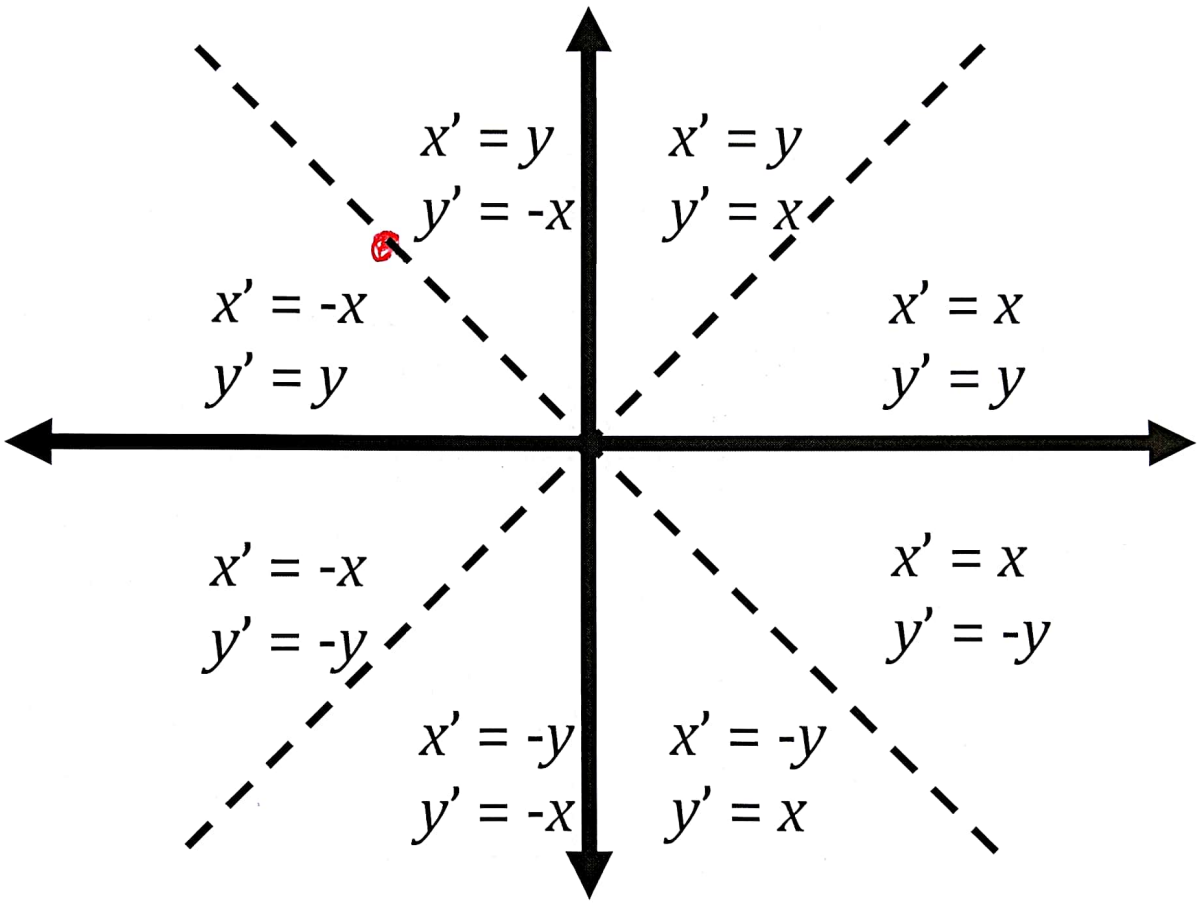
CS 418: Interactive Computer Graphics
In-class Worksheet: Rasterization

Spring 2018

Line Rasterization

1. Transformation



a. Transform (-3,2) to (-6,10) into the first octant

Add (3,-2) → (0,0) and (-3,8)

x' = y y' = -x → (0,0) and (8,3)

b. Transform (3,3) to (5,10) into the first octant

Add (-3,-3) → (0,0) and (2,7)

x' = y y' = x → (0,0) and (7,2)

c. Transform (-2,-2) to (-5,1) into the first octant

Add (2,2) → (0,0) and (-3,3)

x' = -x y' = y → (0,0) and (3,3)

2. Rasterization

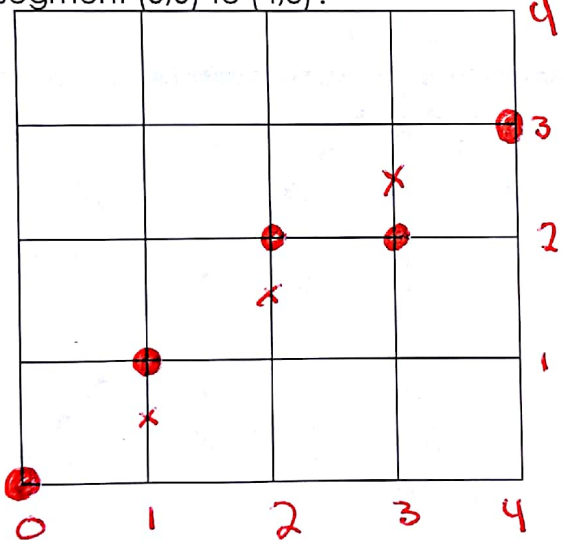
Bresenham's Algorithm

Basic idea: use line equation to choose E or NE

$y = mx + b$
$m = (y_1 - y_0)/(x_1 - x_0)$
$b = y_0 - mx_0$
$f(x,y) = mx + b - y$

If $f(M) < 0 \rightarrow$ E
If $f(M) \geq 0 \rightarrow$ NE

Using Bresenham's Algorithm, what pixels are illuminated to rasterize the line segment (0,0) to (4,3)?



$f(x,y) =$
$mx + b - y$

① $f(1, 1/2) =$
$3/4\,(1) - 1/2 = 1/4$
NE

② $f(2, 3/2) =$
$3/4\,(2) - 3/2 = 0$
NE

③ $f(3, 5/2) =$
$(3/4)\,3 - 5/2 =$
$9/4 - 10/4 = -1/4$
E