

## Image Transformation Rules

### Transformation types:

1. Translation
2. Reflection
3. Rotation
4. Dialation

### Mapping rule for translation:

1. translate  $h$  units horizontally,  $k$  units vertically:  $T_{h,k}(x, y) \rightarrow (x+h, y+k)$

### Mapping rules for reflection:

1. reflection in the x-axis:  $r_{x\text{-axis}}(x, y) \rightarrow (x, -y)$
2. reflection in the y-axis:  $r_{y\text{-axis}}(x, y) \rightarrow (-x, y)$
3. reflection in the line  $y=x$ :  $r_{y=x}(x, y) \rightarrow (y, x)$
4. reflection in the line  $y=-x$ :  $r_{y=-x}(x, y) \rightarrow (-y, -x)$
5. reflection in the origin:  $r_{origin}(x, y) \rightarrow (-x, -y)$

### Mapping rules for rotations:

1. rotating  $90^\circ$  counter-clockwise:  $R_{90}(x, y) \rightarrow (-y, x)$
2. rotating  $90^\circ$  clockwise:  $R_{-90}(x, y) \rightarrow (y, -x)$
3. rotating  $180^\circ$  clockwise/counter-clockwise:  $R_{180}(x, y) \rightarrow (-x, -y)$
4. rotating  $270^\circ$  clockwise:  $R_{-270}(x, y) \rightarrow (-y, x)$
5. rotating  $270^\circ$  counter-clockwise:  $R_{270}(x, y) \rightarrow (y, -x)$

### Mapping rule for dialation:

1. Scaling factor  $k$ :  $k(x, y) \rightarrow (kx, ky)$