

## Filter F1 (Identity Filter)

Input Image  $I$

1	0	0	0	1
0	1	0	1	0
0	0	1	0	0
0	1	1	1	0
1	0	1	0	1

Convolution

Filter  $F1$

0	0	0
0	1	0
0	0	0

ReLU

Output  $FM1$  (ReLU)

1	0	1
0	1	0
1	1	1

Output = 1

Input Region for Output (3,3)

**Calculation for Output (3,3):**

$$(1 \cdot 0) + (0 \cdot 0) + (0 \cdot 0) + (1 \cdot 0) + (1 \cdot 1) + (0 \cdot 0) + (1 \cdot 0) + (0 \cdot 0) + (1 \cdot 0) = 1$$

## Filter F2 (Zero Filter)

Input Image  $I$

1	0	0	0	1
0	1	0	1	0
0	0	1	0	0
0	1	1	1	0
1	0	1	0	1

Convolution

Filter  $F2$

0	0	0
0	0	0
0	0	0

ReLU

Output  $FM2$  (ReLU)

0	0	0
0	0	0
0	0	0

Output = 0

Input Region for Output (3,3)

**Calculation for Output (3,3):**

$$(1 \cdot 0) + (0 \cdot 0) + (0 \cdot 0) + (1 \cdot 0) + (1 \cdot 0) + (0 \cdot 0) + (1 \cdot 0) + (0 \cdot 0) + (1 \cdot 0) = 0$$

## Filter F3 (Edge Detector)

Input Image  $I$

1	0	0	0	1
0	1	0	1	0
0	0	1	0	0
0	1	1	1	0
1	0	1	0	1

Convolution

Filter  $F3$

0	-1	0
-1	4	-1
0	-1	0

ReLU

Output  $FM3$  (ReLU)

4	0	4
0	3	0
3	0	3

Output = 3

Input Region for Output (3,3)

**Calculation for Output (3,3):**

$$(1 \cdot 0) + (0 \cdot -1) + (0 \cdot 0) + (1 \cdot -1) + (1 \cdot 4) + (0 \cdot -1) + (1 \cdot 0) + (0 \cdot -1) + (1 \cdot 0) = 3$$