

Sheet 5

1)

$$I_x = I * G_x$$

i, j	0	1	2	3	4	5	6	7	8	9
0	100	100	0	0	0	0	0	100	-100	-200
1	210	250	-10	-50	0	0	0	400	-200	-600
2	130	200	20	-100	-50	0	0	700	-100	-800
3	40	60	60	-10	-100	-50	0	800	0	-800
4	40	20	10	80	0	-100	-50	800	0	-800
5	40	10	-40	40	100	0	-100	750	0	-800
6	40	0	-40	0	50	100	-50	700	0	-800
7	40	10	-30	0	0	50	0	740	-10	-800
8	30	20	-10	0	0	0	0	580	-20	-600
9	10	10	0	0	0	0	0	190	-10	200

$$I_y = I * G_y$$

i, j	0	1	2	3	4	5	6	7	8	9
0	100	300	400	400	400	400	400	500	500	200
1	10	70	110	50	0	0	0	200	400	200
2	-90	-280	-340	-300	-350	-400	-400	-300	-100	0
3	0	-40	-80	10	100	50	0	0	0	0
4	0	0	-50	-100	0	100	50	0	0	0
5	0	-10	-20	-60	-100	0	100	50	0	0
6	0	0	0	0	-50	-100	-50	0	0	0
7	0	10	30	40	40	-10	-60	-20	10	0
8	-10	-20	-10	0	0	0	0	-200	-400	-200
9	-10	-30	-40	-40	-40	-40	-40	-230	-410	-200

$$|I| = |I_x| + |I_y|$$

i, j	0	1	2	3	4	5	6	7	8	9
0	200	400	400	400	400	400	400	600	600	400
1	220	320	120	100	0	0	0	600	600	800
2	220	480	360	400	400	400	400	100	200	800
3	40	100	140	20	200	100	0	800	0	800
4	40	20	60	180	0	200	100	800	0	800
5	40	20	60	100	200	0	200	800	0	800
6	40	0	40	0	100	200	100	700	0	800
7	40	20	60	40	40	60	60	760	20	800
8	40	40	20	0	0	0	0	780	420	800
9	20	40	40	40	40	40	40	420	420	400

tan⁻¹(I_y/I_x)

$$\tan^{-1}(300 / 100)$$

$$\theta = \tan^{-1}\left(\frac{I_y}{I_x}\right)$$

i, j	0	1	2	3	4	5	6	7	8	9
0	45	71.6	90	90	90	90	90	78.7	-78.7	-45
1	2.7	15.6	-84.8	-45	0	0	0	26.6	-63.4	-18.4
2	-34.7	-54.5	-86.6	71.6	81.9	-90	-90	-23.2	45	0
3	0	-33.7	-53.1	-45	-45	-45	0	0	0	0
4	0	0	-78.7	-51.3	0	-45	-45	0	0	0
5	0	-45	26.6	-56.3	-45	0	-45	3.8	0	0
6	0	0	0	0	-45	-45	45	0	0	0
7	0	45	-45	90	90	-11.3	-90	-1.5	-45	0
8	-18.4	-45	45	0	0	0	0	-19	87.1	18.4
9	-45	-71.6	-90	-90	-90	-90	-90	-50.4	88.6	45

- 2) By using two thresholding values T_1 and T_2 . Where T_1 is called a weak threshold, such that edges with edge intensity lower than T_1 **will not be** considered edges, and T_2 is called a strong threshold, such that edges with edge intensity greater than T_2 **will be** considered edges. Any values that lie between T_1 and T_2 are only considered edges if they are connected to strong edges.