576 Fall22 HW3
Name: Sung-Fu Han
USC ID: 2644230653

1-1

f(x,y) = 188 180 155 149 179 116 86 96 168 179 168 174 180 111 86 95 150 166 175 189 165 101 88 97 163 165 179 184 135 90 91 96 170 180 178 144 102 87 91 98 175 174 141 104 85 83 88 96 153 134 105 82 83 87 92 96 117 104 86 80 86 90 92 103	F(x,y) = [[1016.2 216. -6.8 -27.2 29.3 -20.8 -11.2 8.] [136.1 52.6 -93.5 -7.3 34. -18.8 -11.3 10.6] [-45.9 -49.2 13.9 53.8 11.1 -24.7 -0.1 8.4] [8.8 38.1 47.9 15.6 -17.9 -10.9 4.2 3.7] [-1.2 -5.9 -1.2 -4.7 0.8 6.6 4.8 0.2] [-4.5 -1.2 3.3 8.1 7. 6.1 -0.2 1.2] [-2.9 -2.1 0.9 -1.5 0. -3.4 -0.9 -1.2] [-0.8 -3.4 -0.6 -1.8 -4.2 -1.3 2.3 1.6]]
Table K.1 – Luminance quantization table [16,11,10,16,24,40,51,61], [12,12,14,19,26,58,60,55], [14,13,16,24,40,57,69,56], [14,17,22,29,51,87,80,62], [18,22,37,56,68,109,103,77], [24,35,55,64,81,104,113,92], [49,64,78,87,103,121,120,101], [72,92,95,98,112,100,103,99]	**Quantized F(x,y) =** [[64. 20. -1. -2. 1. -1. 0. 0.] [11. 4. -7. 0. 1. 0. 0. 0.] [-3. -4. 1. 2. 0. 0. 0. 0.] [1. 2. 2. 1. 0. 0. 0. 0.] [0. 0. 0. 0. 0. 0. 0. 0.] [0. 0. 0. 0. 0. 0. 0. 0.] [0. 0. 0. 0. 0. 0. 0. 0.] [0. 0. 0. 0. 0. 0. 0. 0.]]

1-2 Zigzag scan AC values

20, 11, -3, 4, -1, -2, -7, -4, 1, 0, 2, 1, 0, 1 -1, 1, 2, 2, 0, 0, 0, 0, 0, 1, 0, 0, 0

1-3 Intermediary notation

using Run-length encoding (RLE)
Negative integer is represented using 1's complement.

Symbol	<run length, size> <amplitude>	First Symbol Prefix Huffman Code	Second Symbol Integer Code	total bits: 88 bits
20	<0,5><20>	11010	10100	10

11	<0,4><11>	1011	1011	8
-3	<0,2><-3>	01	00	4
4	<0,3><4>	100	100	6
-1	<0,1><-1>	00	0	3
-2	<0,2><-2>	01	01	4
-7	<0,3><-7>	100	000	6
-4	<0,3><-4>	100	011	6
1	<0,1><1>	00	1	3
2	<1,2><2>	11011	10	7
1	<0,1><1>	00	1	3
1	<1,1><1>	1100	1	5
-1	<0,1><-1>	00	0	3
1	<0,1><1>	00	1	3
2	<0,2><2>	01	10	4
2	<0,2><2>	01	10	4
1	<5,1><1>	1111010	1	8
0…..	<End of Block>	1010		4

1-4 JPEG bit stream

11010 10100 1011 1011 01 00 100 100 00 0 01 01 100 000 100 011 00 1 11011 10 00 1 1100 1 00 0 00 1 01 10 01 10 1111010 1 1010

1-5

8bits*8*8 blocks= 512 bits -> 91 bits after encoded

512/91 = **5.63**