

# CSCI576 - HW3

## Question 1: DCT Coding

### 1. DCT coefficients

[[-7.75, 215.97, -6.82, -27.17, 29.25, -20.76, -11.25, 7.95],  
[136.15, 52.63, -93.46, -7.27, 34.01, -18.82, -11.26, 10.64],  
[-45.86, -49.21, 13.92, 53.76, 11.1, -24.67, -0.15, 8.41],  
[8.84, 38.07, 47.95, 15.61, -17.87, -10.85, 4.17, 3.68],  
[-1.25, -5.92, -1.24, -4.72, 0.75, 6.6, 4.84, 0.24],  
[-4.47, -1.2, 3.35, 8.12, 7.01, 6.12, -0.15, 1.19],  
[-2.92, -2.12, 0.85, -1.46, 0.0, -3.36, -0.92, -1.22],  
[-0.82, -3.38, -0.59, -1.8, -4.2, -1.26, 2.32, 1.63]]

### Quantized coefficients

[[0, 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]]

### 2. Ignore DC value, the resulting 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, 0, 1, 0, 0, 0, 0,  
0,  
0, 0, 0, 0.

### 3. For AC sequence, intermediary notation:

<0,5><20> <1,4><11> <2,2><-3> <3,3><4> <4,1><-1> <5,2><-2> <6,4><-  
3> <7,3><-4> <8,1><1> <0,2><2> <1,1><1> <0,1><1> <1,1><-1>  
<2,1><1> <3,2><2> <4,2><2> <0,1><1> EOB

### 4. JPEG bitstream

1111110 1000000 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

### 5. Compression Ratio

$105 / (64 * 8) = 0.205$