

CSCI 576 ASSIGNMENT - 3

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Theory part:

Question 1:

- DCT Values:

```
[[1016.2500000000001 , 215.97458246332872 , -6.822643685768739 ,  
-27.171371618158663 , 29.250000000000004 , -20.757133795394424 ,  
-11.24506705791655 , 7.950640903654007] ,  
[136.14648589006734 , 52.63209457008155 , -93.46312437115601 ,  
-7.2736190522475255 , 34.0070895450889 , -18.821367764107677 ,  
-11.255810950407463 , 10.640431750450414] ,  
[-45.85937022148366 , -49.20852206653994 , 13.924621202458749 ,  
53.76293673570234 , 11.09616979579232 , -24.671989730410182 ,  
-0.14644660940672716 , 8.411864295469638] ,  
[8.844032572845926 , 38.06732981054131 , 47.948952807474825 ,  
15.613011625370692 , -17.873228416560835 , -10.854850225927269 ,  
4.171683756220543 , 3.684122964116185] ,  
[-1.25000000000000502 , -5.916037196198077 , -1.240904868073507 ,  
-4.7171783543216135 , 0.7500000000000001 , 6.600401568414383 ,  
4.8435684271404185 , 0.24172588275463736] ,  
[-4.470823535757372 , -1.201889917082564 , 3.3476326544491606 ,  
8.120023508225646 , 7.009779292963154 , 6.123532407338718 ,  
-0.15174095794081932 , 1.1856018268959985] ,  
[-2.922868948293601 , -2.1184947626132704 , 0.8535533905932722 ,  
-1.4561454990286222 , 0.003982831430797695 , -3.356566011135989 ,  
-0.9246212024587466 , -1.2151280739837946] ,  
[-0.824138670527276 , -3.3846945153966708 , -0.58601373840294 ,  
-1.7969042522470282 , -4.204588078003823 , -1.2558520992811513 ,  
2.3179732798519552 , 1.6313613972090453]]
```

After Quantization (Q=100):

```
10.0 , 2.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0  
1.0 , 1.0 , -1.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0  
0.0 , 0.0 , 0.0 , 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 , 0.0 , 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 , 0.0  
0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0
```

- Zig-zag order of AC values:

2.0 , 1.0 , 0.0 , 1.0, 0.0 , 0.0 , -1.0 , 0.0 , 0.0 , 0.0 , 0.0 ,
 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 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 , 0.0 , 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 , 0.0 , 0.0 , 0.0 ,
 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0 , 0.0

- Intermediary notation:

<0,2> <2>
 <0,1><1>
 <1,1><1>
 <2,1><-1>
 <9,1><1>
 <0,0>

- Bit stream:

01 10 00 1 1100 1 11100 0 111111001 1 1010

- Compression Ratio:

No.of bits without compression = $64 \times 8 = 512$ bits

No.of bits after compression (bit stream length) = 32 bits

Compression ratio = $512/32 = 16$