Question 1: DCT Coding

Part a

Using 2D DCT formula

```
[   [1016, 215, -6, -27, 29, -20, -11, 7],
    [136, 52, -93, -7, 34, -18, -11, 10],
    [-45, -49, 13, 53, 11, -24, 0, 8],
    [8, 38, 47, 15, -17, -10, 4, 3],
    [-1, -5, -1, -4, 0, 6, 4, 0],
    [-4, -1, 3, 8, 7, 6, 0, 1],
    [-2, -2, 0, -1, 0, -3, 0, -1],
    [0, -3, 0, -1, -4, -1, 2, 1]]
```

After quantization:

```
[   [64, 20, -1, -2, 0, 0, 0, 0],
    [11, 4, -7, 0, 0, 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]]
```

Part b

Using Zigzag on Part a
[20, 11, -3, 4, -1, -2, -7, -4, 1, 0, 2, 1, 0, 0, 0, 0, 2, 2, 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]

Part c

AC values of intermediary notation:
<0, 5> <20>
<0, 4> <11>
<0, 2> <-3>
<0, 3> <4>
<0, 1> <-1>
<0, 2> <-2>
<0, 3> <-7>

<0, 3> <-4>
<0, 1> <1>
<1, 2> <2>
<0, 1> <1>
<4, 2> <2>
<0, 2> <2>
<5, 1> <1>

Part d

11010 10100 1011 1011 01 000 100 100 00 00 01 001 100 0000 100 0011 00 1 11011 10 00 1 1111111000 10 01 10 1111010 1

No spaces:
1101010100101110110100010010000000100110000001000011001110111000111111111000100 11011110101

Part e

89 / 512 = 0.174