

# CORRECT SAMPLE JPEG MATRICES FOR CSE 679 LAB

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Sample block:

$$\begin{bmatrix} 140 & 144 & 147 & 140 & 139 & 155 & 179 & 175 \\ 144 & 152 & 140 & 147 & 140 & 148 & 167 & 179 \\ 152 & 155 & 136 & 167 & 163 & 162 & 152 & 172 \\ 168 & 145 & 156 & 160 & 152 & 155 & 136 & 160 \\ 162 & 148 & 156 & 148 & 140 & 136 & 147 & 162 \\ 147 & 167 & 140 & 155 & 155 & 140 & 136 & 162 \\ 136 & 156 & 123 & 167 & 162 & 144 & 140 & 147 \\ 148 & 155 & 136 & 155 & 152 & 147 & 147 & 136 \end{bmatrix}$$

Shifted block:

$$\begin{bmatrix} 12 & 16 & 19 & 12 & 11 & 27 & 51 & 47 \\ 16 & 24 & 12 & 19 & 12 & 20 & 39 & 51 \\ 24 & 27 & 8 & 39 & 35 & 34 & 24 & 44 \\ 40 & 17 & 28 & 32 & 24 & 27 & 8 & 32 \\ 34 & 20 & 28 & 20 & 12 & 8 & 19 & 34 \\ 19 & 39 & 12 & 27 & 27 & 12 & 8 & 34 \\ 8 & 28 & -5 & 39 & 34 & 16 & 12 & 19 \\ 20 & 27 & 8 & 27 & 24 & 19 & 19 & 8 \end{bmatrix}$$

After FDCT:

$$\begin{bmatrix} 185.88 & -17.962 & 14.943 & -9.0778 & 23.125 & -9.0856 & -13.901 & -19.110 \\ 20.365 & -34.045 & 26.557 & -9.1747 & -11.106 & 10.935 & 13.866 & 6.7143 \\ -10.547 & -23.469 & -1.6402 & 5.9121 & -18.238 & 3.3890 & -20.329 & -1.0530 \\ -8.2518 & -5.0009 & 14.524 & -14.729 & -8.3648 & -2.5596 & -3.0050 & 8.2253 \\ -3.3750 & 9.5359 & 8.0480 & 1.2188 & -11.125 & 18.051 & 18.450 & 15.068 \\ 3.7574 & -2.1876 & -18.039 & 8.4227 & 8.1706 & -3.4929 & 0.92215 & -6.9987 \\ 8.8337 & 0.65168 & -2.8289 & 3.5882 & -1.2401 & -7.3423 & -1.1098 & -2.0184 \\ 0.014635 & -7.8035 & -2.3794 & 1.5633 & 1.1648 & 4.2876 & -6.3987 & 0.26693 \end{bmatrix}$$

Quantization table:

$$\begin{bmatrix} 3 & 5 & 7 & 9 & 11 & 13 & 15 & 17 \\ 5 & 7 & 9 & 11 & 13 & 15 & 17 & 19 \\ 7 & 9 & 11 & 13 & 15 & 17 & 19 & 21 \\ 9 & 11 & 13 & 15 & 17 & 19 & 21 & 23 \\ 11 & 13 & 15 & 17 & 19 & 21 & 23 & 25 \\ 13 & 15 & 17 & 19 & 21 & 23 & 25 & 27 \\ 15 & 17 & 19 & 21 & 23 & 25 & 27 & 29 \\ 17 & 19 & 21 & 23 & 25 & 27 & 29 & 31 \end{bmatrix}$$

After quantization:

$$\begin{bmatrix} 62 & -4 & 2 & -1 & 2 & -1 & -1 & -1 \\ 4 & -5 & 3 & -1 & -1 & 1 & 1 & 0 \\ -2 & -3 & 0 & 0 & -1 & 0 & -1 & 0 \\ -1 & 0 & 1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & -1 & 1 & 1 & 1 \\ 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

To compute intermediate representations of DC and AC coefficients, recall the formula  $SSS = \lfloor \log_2 |value| \rfloor + 1$ , where  $value$  is self-explanatory. For the DC coefficient, produce the intermediate representation  $(SSS)(value)$  and for the AC coefficients, produce the intermediate representation

$$(skip, SSS)(value),$$

where  $skip$  is the number of 0s skipped before encoding  $value$ . The encoded bit sequences for the DC and AC coefficients are  $(H_{DC})(\text{binary representation of } value)$  and  $(H_{AC})(\text{binary representation of } value)$ , where  $H_{DC}$  is the Huffman codeword for  $SSS$  and  $H_{AC}$  is the Huffman codeword for  $(skip, SSS)$ . You can find the former and latter codewords in the files `Default_huffman_codewords.txt` and `Huffman.txt`, respectively, in the `lab_example` directory on the course website.