$$A = \begin{pmatrix} 23 & 25 & 28 & 26 \\ 27 & 29 & 26 & 28 \\ 25 & 29 & 21 & 22 \end{pmatrix}$$

A = {23, 25, 28, 26, 27, 29, 26, 28, 25, 29, 21, 22}

Once the data for each pixel have been read-out, this information needs to be transmitted back to Earth from the satellite. To do this, the individual numbers that represent the individual pixel counts have to be transmitted sequentially in a carefully defined stream of data. In the example to the left, a 3x3 image is converted into a string of numbers.

To properly encode and decode the data string, the format of the image must be known (3 x 4) along with the reading sequence {a11, a12, a13, a14, a21, a22, a23, a24, a31, a32, a33, a34}.

Problem 1 - An image is obtained by a satellite sensor and reduced to the data string {11, 14, 12, 12, 18, 15, 21, 16, 17, 25, 19, 17, 4, 8, 13, 16, 5, 9, 20, 32, 12, 7, 19, 13, 11, 13, 14, 21, 16, 8} If the format is a 5x6 image, what will the array look like when it is recovered from the data string?

Problem 2 - During transmission, the 13th data word in the string in Problem 1 was corrupted. Which pixel in the image was damaged during transmission?

Problem 3 - What is the data string that corresponds to the following image array?

$$I = \begin{pmatrix} 23 & 22 & 24 & 23 & 24 \\ 24 & 83 & 24 & 25 & 22 \\ 22 & 22 & 23 & 23 & 24 \\ 22 & 24 & 23 & 24 & 79 \\ 23 & 22 & 22 & 23 & 24 \\ 24 & 23 & 24 & 22 & 25 \\ 23 & 24 & 23 & 65 & 22 \\ 99 & 24 & 23 & 25 & 22 \end{pmatrix}$$

Problem 4 - In which positions in the data stream sequence are the pixels I_{22}, I_{45}, I_{27} and I_{18} found, and what are their values?

Problem 1 - An image is obtained by a satellite sensor and reduced to the data string {11, 14, 12, 12, 18, 15, 21, 16, 17, 25, 19, 17, 4, 8, 13, 16, 5, 9, 20, 32, 12, 7 ,19, 13, 11, 13, 14, 21, 16, 8} If the format is a 6x5 image, what will the array look like when it is recovered from the data string?

Answer:

$$I = \begin{pmatrix} 11 & 14 & 12 & 12 & 18 \\ 15 & 21 & 16 & 17 & 25 \\ 19 & 17 & 4 & 8 & 13 \\ 16 & 5 & 9 & 20 & 32 \\ 12 & 7 & 19 & 13 & 11 \\ 13 & 14 & 21 & 16 & 8 \end{pmatrix}$$

Problem 2 - During transmission, the 13th data word in the string was corrupted. Which pixel in the image was damaged during transmission?

Answer: **$I_{33} = 4$**

Problem 3 - What is the data string that corresponds to the following image array?

$$I = \begin{pmatrix} 23 & 22 & 24 & 23 & 24 \\ 24 & 83 & 24 & 25 & 22 \\ 22 & 22 & 23 & 23 & 24 \\ 22 & 24 & 23 & 24 & 79 \\ 23 & 22 & 22 & 23 & 24 \\ 24 & 23 & 24 & 22 & 25 \\ 23 & 24 & 23 & 65 & 22 \\ 99 & 24 & 23 & 25 & 22 \end{pmatrix}$$

Answer: **{23, 22, 24, 23, 24, 24, 83, 24, 25, 22, 22, 22, 23, 23, 24, 22, 24, 23, 24, 79, 23, 22, 22, 23, 24, 24, 23, 24, 22, 25, 23, 24, 23, 65, 22, 99, 24, 23, 25, 22}**

Problem 4 - In which positions in the data stream sequence are the pixels I_{22}, I_{54}, I_{72} and I_{81} found, and what are their values?

Answer: At positions 7, 24, 32 and 36 with values of 83, 23, 24 and 99.