

1. Multiply the following binary numbers

$$\begin{array}{r} 11 \\ \times 11 \\ \hline 11 \\ + 11 \\ \hline 1001 \end{array}$$

$$\begin{array}{r} 101 \\ \times 10 \\ \hline 000 \\ + 101 \\ \hline 1010 \end{array}$$

$$\begin{array}{r} 110 \\ \times 101 \\ \hline 110 \\ + 000 \\ \hline 110 \\ + 1110 \\ \hline 11110 \end{array}$$

$$\begin{array}{r} 1011 \\ \times 1101 \\ \hline 1011 \\ + 1011 \\ \hline 10000 \\ + 101110 \\ \hline 10001111 \end{array}$$

$$\begin{array}{r} 1010 \\ \times 101 \\ \hline 1010 \\ + 0000 \\ \hline 1010 \\ + 101010 \\ \hline 110010 \end{array}$$

$$\begin{array}{r} 1110001 \\ \times 111 \\ \hline 1110001 \\ + 1110001 \\ \hline 1110001 \\ + 1110001 \\ \hline 1100010111 \end{array}$$

$$\begin{array}{r} 101010 \\ \times 1001 \\ \hline 101010 \\ + 000000 \\ \hline 000000 \\ + 101010 \\ \hline 101111010 \end{array}$$

$$\begin{array}{r} 1011 \\ \times 101 \\ \hline 1011 \\ + 1011 \\ \hline 0000 \\ + 1011 \\ \hline 110111 \end{array}$$

$$\begin{array}{r} 1100 \\ \times 101 \\ \hline 1100 \\ + 0000 \\ \hline 1100 \\ + 111100 \\ \hline 111100 \end{array}$$

$$\begin{array}{r} 1011 \\ \times 11 \\ \hline 1011 \\ + 1011 \\ \hline 1011 \\ + 1011 \\ \hline 100001 \end{array}$$

$$\begin{array}{r} 1001111 \\ \times 0110 \\ \hline 00000000 \\ + 10011111 \\ \hline 10011111 \\ + 00000000 \\ \hline 0111011010 \end{array}$$

$$\begin{array}{r} 111011 \\ \times 1011 \\ \hline 111011 \\ + 111011 \\ \hline 111011 \\ + 111011 \\ \hline 1010001001 \end{array}$$

Handwritten notes in red ink:

- 0 + 0 = 0
- 0 + 1 = 1
- 1 + 0 = 1
- 1 + 1 = 10

$$\begin{array}{r} 110101 \\ \times 1101 \\ \hline 110101 \\ + 000000 \\ \hline 110101 \\ + 110101 \\ \hline 1010110001 \end{array}$$

$$\begin{array}{r} 111111 \\ \times 101010 \\ \hline 111111 \\ + 000000 \\ \hline 111111 \\ + 000000 \\ \hline 111111 \\ + 111111 \\ \hline 101001010110 \end{array}$$

$$\begin{array}{r}
 101.101 \\
 \times 110.010 \\
 \hline
 .000\ 000 \\
 ,01011\ 01 \\
 ,000000\ 0 \\
 ,000000 \\
 ,101101 \\
 ,101101 \\
 \hline
 10001\ 1001.010
 \end{array}$$

$$\begin{array}{r}
 0.1101 \\
 \times 0.1011 \\
 \hline
 01101 \\
 ,01101 \\
 ,000000 \\
 ,01101 \\
 \hline
 01000.1111
 \end{array}$$

$$\begin{array}{r}
 10110101000101 \\
 \times 1011 \\
 \hline
 ,10110101000101 \\
 ,10110101000101 \\
 00000000000000 \\
 10110101000101 \\
 \hline
 1111100011110111
 \end{array}$$

$$\begin{array}{r}
 111011 \\
 \times 1011 \\
 \hline
 ,111011 \\
 ,111011 \\
 ,000000 \\
 111011 \\
 \hline
 1010001001
 \end{array}$$

$$\begin{array}{r}
 10100001111011 \\
 \times 10011 \\
 \hline
 ,10100001111011 \\
 ,10100001111011 \\
 ,00000000000000 \\
 ,00000000000000 \\
 10100001111011 \\
 \hline
 110000000100100001
 \end{array}$$