The first commands of the code reset the command window. It does this by clearing the screen and memory while also closing any other open MATLAB windows. After the command window is reset, the user will receive a prompt in a dialog box requesting a binary bit sequence. This input is the digital information that will be modulated. Only a bit sequence where the number of bits is divisible by three can be modulated. This is so because for eight quadrature amplitude modulation (8QAM) to occur, there needs to be a group of 3 input bits that consist of a quadrature bit, an inphase bit and a C bit. These three bits are dependent on each other to determine the phase shift and amplitude of the wave. If, however the user enters a bit sequence with a length is not divisible by 3, an alert box will be displayed stating that they have entered an invalid number of bits. It should also be noted that the maximum number of bits that could be entered in the bit sequence is 51 bits. This is due to the MATLAB function bin2dec used being able to only store 52 bits and the closest multiple of 3 that's less than 52 is 51 thus 51 bits.

The next section of code involves the sorting of the input bit sequence. The input bit sequence must first be converted from a string to a number. This is done using the MATLAB functions str2num and bin2dec. The next step is to place the newly converted numbers into a matrix. This matrix will consist of three rows. The first row will contain the quadrature bits (Q bits) while the second row holds the inphase bits (I bits) and the final row has the C bits. The number of columns in the matrix will be dependent on how many groups of three are present in the input bit sequence. The matrix will then be manipulated where a true bit (1) will be represented as 1 and a false bit (0) will be represented as -1. This matrix will represent the bit splitter found in an 8 QAM circuit in real life.

With the use of a for loop and if statements, the 2-to-4-level converter and the reference oscillator were simulated. The C bit value from the matrix will be then used to determine the amplitude of that portion of the signal. If the C bit is true (1) the amplitude can be +/- 1.307 and if false (0) it can +/- 0.541. The Q bit and I bit determine the polarity. A cosine wave signal where the minimum carrier frequency is the bit rate, is then multiplied to the calculated amplitude to produce the Q bit signal. A sine wave signal with the same frequency is also multiplied to the calculated amplitude to produce the I bit signal. The sum of the quadrature signal and the inphase signal will result in the 8 QAM signal.

The subplot function was used to display two different graphs in the same window. One plot displays the bit sequence entered by the user and the other shows the corresponding 8 QAM signal. It should be noted that the x axis for the bit sequence plot changes according to the number bits in the bit sequence.