1. Write Matlab® code to test whether a scalar value, \( x \), is larger than 1, in which case the value of \( x \) is set to 1, or whether \( x \) is less than \(-1\), in which case the value of \( x \) is set to \(-1\). (Otherwise, \( x \) is unchanged.)

2. Write a Matlab® function called \( \texttt{ll.m} \) (two letter el's meant to represent the parallel operator for resistors) with one argument, \( \texttt{Rarray} \), (which is an array of resistor values). \( \texttt{ll.m} \) has the following specifications:
   i) Its return value is called \( \texttt{Rpar} \) (meaning "parallel resistance").
   ii) It has comments at the beginning that describe its use and purpose. These comments print out when \texttt{help ll} is entered at the Matlab® prompt.
   iii) It tests the values in \( \texttt{Rarray} \) to see if any of them have negative real parts. If so, it prints a warning that one or more input values has negative resistance.
   iv) It computes the parallel resistance value for all the values in \( \texttt{Rarray} \). \( \texttt{Rarray} \) is assumed to be a horizontal vector array.

3. Use addition and the function written in problem 2 in a one-line command to find the resistance of the following network of resistors:
   10 ohms in parallel with a branch that consists of two 20 ohm resistors in parallel that are in series with a 5 ohm resistor
   Hint: the command to find the resistance of a 72 ohm resistor in parallel with a 12 ohm resistor and 24 ohm resistor in series is as follows:
   \[
   \texttt{Req = ll([72, 12 + 24])}
   \]

4. Write a Matlab® function called \( \texttt{spec_plot.m} \) that computes and plots the magnitude of the Fast Fourier Transform of its argument.

5. Write a Matlab function called \( \texttt{label_plot.m} \) that adds labels to a plot. Examples of the use of this function are as follows:
   \[
   \texttt{>> label_plot('yaxis','Volts')}
   \texttt{>> label_plot('xaxis','time')}
   \texttt{>> label_plot('title','Spectrum')}
   \]
   The first argument of the function is one of three terms, \( \texttt{yaxis} \), \( \texttt{yaxis} \), or \( \texttt{title} \), and the second argument is a string containing the desired label. Use a switch statement to decide what the first argument is, and print out an error message if it doesn't match any of the three allowed choices.
6. Write a Matlab® function called \texttt{z.m} to calculate an impedance value. Examples of the use of this function are as follows:
\begin{verbatim}
>> z('R',24,0)       % Returns a value of 24 (ohms). Third argument is frequency.
>> z('L',1e-3,100)   % Returns a value of j*0.001*100 representing jwL.
>> z('C',0.2e-6,100) % Returns a value of 1/(j*0.2uF*100r/s) representing 1/jwC.
\end{verbatim}

7. Write functions called \texttt{aand}, and \texttt{aor} that each operate on a single argument that is a logical array of 1's and 0's. If the input array has more than one row and more than one column, \texttt{aand} performs an AND function on the numbers in each column and outputs a horizontal vector array. If the input array is a vector (horizontal or vertical), the \texttt{aand} performs an AND function on all the numbers in the array. \texttt{aor} behaves in a similar fashion but with OR functions.

8. Use your functions from problem 7 to compute the output of a logic circuit of four gates and two inputs. (Your choice of logic circuit.) Show your logic circuit, the input values, the Matlab® command line to compute the output value of the circuit, and the answer you found.

9. Write a function that has input arguments \(x\) (a row vector) and \(n\) (a scalar) and outputs a matrix, \(x^{\text{pow}}\), of the following form:
\[
x^{\text{pow}} = \begin{bmatrix}
x \\
x .^2 \\
\vdots \\
x .^n
\end{bmatrix}
\]

The function should test for invalid \(n\), (i.e., \(n < 0\)), and return an empty array if \(n\) is invalid.

10. Write a Matlab® function called \texttt{phasor_polar.m} that converts phasors in rectangular form \((a+bj)\) to polar form \([\text{mag, phase}]\). This function returns two values, \(\text{mag}\) (magnitude) and \(\text{phase}\) (in radians). The function should accept an array of phasors and return corresponding arrays for \text{mag} and \text{phase}.