As you read the accompanying Matlab handout, answer the questions below. They are presented in the order the material is covered in the handout.

1. Start Matlab. What is the sine of 30°? __________

2. Solve $10^x = 5$. $x = __________$

3. Find $\sqrt{-12 + i}$ __________

4. Write the Matlab command to make the vector $x = [10 \ 20 \ 30]$ ________________

5. Write the Matlab command to make the vector $y = [10 \ 10.1 \ 10.2 \ 10.3 \ldots \ 100]$ (you can’t use ... in your answer; you must write down the exact command you would use to create this vector).

6. What is the Matlab command to make a matrix $x$ whose first row is $4 \ -2 \ -1$ and second row is $\pi \ 2\pi \ 3\pi$?

7. Write the Matlab command to make a 20 row by 1000 column matrix, all of whose values are -1. Hint: the command does not explicitly enumerate each value (ie if you need to take 4 pages to write the answer, you are doing it the wrong way!)

8. Use Matlab to solve the following system of linear equations:
   
   \[
   \begin{align*}
   x + y + z &= 6 \\
   2x + 3y + z &= 1 \\
   -x - 2y + 2z &= 5
   \end{align*}
   \]

   $x = __________ \ y = __________ \ z = __________$

9. Does Matlab care about capitalization? That is, does it treat the variables $R$ and $r$ as the same or different? You could find the answer in the help system, but it’s probably faster just to try assigning a value to a variable called “R” and seeing if “r” can operate on it. __________

10. You want to design a filter for your mp3 player to improve its bass response. One simple way to do this is to add the circuit fragment shown below. (Actually, this decreases the treble response, but if you increase the overall volume so the treble stays the same, the bass will sound much louder). The controlling equation is:

   \[ f = \frac{1}{2\pi RC} \]

   where bass frequencies from 0 to a maximum of frequency $f$ (in Hz) are boosted, $R$ is measured in $\Omega$ and $C$ is measured in Farads.

   If you use a 1uF capacitor (uF means “one-millionth of a Farad) plot the bass frequency $f$ as the resistance $R$ rises from 150 ohms to 1500 ohms. To make a smooth plot, plot many intermediate values as $R$ increases; at least 100. To do this, first create a vector $R$ of your desired values (hint: use the linspace command). Then, create the $f$ vector using the above formula with your $R$ vector. Last, use the plot command to plot the frequency vs. the resistance. Use the title, xlabel, and ylabel commands to give your plot a title and to annotate the x and y axes. Print using the menu on the plot figure and staple to this assignment. Getting errors? Did you read the bolded section on Matrix Mathematics in the tutorial?