MATLAB Bootcamp – Homework 2

Save your code in a .m file (e.g. HW2.m). Add comments by including `%` signs before any text you want MATLAB to ignore. You are not obligated to submit anything to me, but if you want to check your answers you can email me your code and I will have a look at it. Also, feel free to contact me if you have any problems! kdrushka@ucsd.edu .

1. Use Matlab to calculate the volume of a cylinder having height 10cm and a radius of 1cm. What about a radius of 3cm? What about 5cm and 9cm? (Hint: create a vector for the radius that contains all values of the radius, and use that variable in an equation for the volume of a cylinder).

2. Use Matlab to calculate the value of $76 - (37 - 7e^{5+\cos\left(\frac{\pi}{3}\right)})$. (Hint: be careful with the parentheses). Give the answer to 8 decimal places (Hint: use the command `format` to display the output).

3. Plot the function $y = \frac{10\sin(x)}{x}$, where **x** is a vector of length 1000 that ranges from –100 to 100. (Hint, try the `linspace` command). Don't forget that you need a period (.) to do element-by-element division.

4. Add "random noise" to the vector **y** from question 3:
   a. First, use the function `randn` to create a vector (of the same size as **y)** of normally-distributed random values; this vector is the "noise".
   b. Create a new variable called **ynoisy**, equal to the "noise" plus **y**.
   c. Without clearing the figure from question 3, plot **ynoisy** against **x** using a different color and pattern.

5. Download the file called hw2.mat from the class website: http://www-pord.ucsd.edu/~kdrushka/matlab/hw2.mat . hw2.mat contains the matrices **K** and **P**.
   a. Load hw2.mat into your workspace. Make sure Matlab is running in the same directory where hw2.mat is stored, so that it can find hw2.mat. (If you can't figure out how to do this, you won't be able to do the rest of the question, so please contact me!)
   b. Find the (row,column) of all elements in **K** that are greater than 3. (i.e. use `find` with two outputs).
   c. Find the *linear index* of all elements in **K** that are greater than 3. (i.e. use `find` with only one output).
   d. Using the index found in part *c*, set all elements in **K** that are greater than 3 to 10.
   e. Calculate the product of each element of **K** and each element of **P** (Hint, include a period (**.**) before the `*` to do element-by-element multiplication).
   f. Find all elements for which the product of **K** and **P** is negative, and set the index of those elements to zero in both **K** and **P**.

6.
   a. Create a scalar called **p**, which can have any value you like. Use Matlab to evaluate the expression $f = 2p^{-2} + \frac{7p-5}{3p+1} + \ln\left(\frac{p}{3}\right)$

   b. Now, make **p** a vector of any length >1, and evaluate the expression again. Note that you will have to include periods (.) in the equation so that it correctly performs element-by-element math.