Exercises for Practical #0

In this practical you will start to play with vectors and matrices.

1. Create a vector which contains the current date in the form `[DD, MM, YY]`.
2. Create a vector of integers from 1 to 100. For the vector you've just created, compute the:
   (a) Mininum
   (b) Maximum
   (c) Average
   (d) Standard deviation
3. Construct a vector of all prime numbers less than 1000. How many are there? What is their sum? What is their average?
4. Multiply the 10^{th} entry of the vector above by 10, and delete entries 20–30. What is the vector's average now?
5. Compute the 2 norm of `A = [1 2 3; 4 5 6; 7 8 9];`
6. Compute the 2 norm of `[1 2 ... 100; ... ; 901 902 ... 1000];`
7. What is the sum of the prime factors of 123456789?
8. What is the second entry in the solution of `(A + I)*x = [1; 2; 3]`, where `A` is the 3×3 matrix from above?
9. What is the second entry in the solution of `(B + I)*x = [1; 2; 3]`, where `B` is obtained from `A` by reversing the first row?
10. Construct a vector `x` of 1000 equispaced points between 0 and 10.
11. Construct a random vector of size 26 where each entry is a random character from the English alphabet. How many unique letters did you get? (Hint: check out `randi, char, unique` and ASCII code.)
12. On a single figure, plot $\sin(x)$, $\sin(x^2)$, and $\sin(x) + \sin(x^2)$ against x on the interval $[0, 10]$ in different `colors` and `linestyles` (see `help plot`). Add a title, legends, and a grid to your figure.
13. Plot a semi-log plot of $\exp(-x^2)$ on the interval $[0, 5]$.
14. (Advanced) Plot the eigenvalues of a random 10×10 matrix. On a subplot, plot the eigenvectors. (Hint: check out `eig`.)