

## 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) Minimum
  - (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<sup>th</sup> 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  $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ ;
6. Compute the 2 norm of  $\begin{bmatrix} 1 & 2 & \dots & 100 & \dots & 901 & 902 & \dots & 1000 \end{bmatrix}$ ;
7. What is the sum of the prime factors of 123456789?
8. What is the second entry in the solution of  $(A + I)*x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ , where A is the  $3 \times 3$  matrix from above?
9. What is the second entry in the solution of  $(B + I)*x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ , 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  $10 \times 10$  matrix. On a subplot, plot the eigenvectors. (Hint: check out `eig`.)