DEDY DWI PRASTYO Part 1
Even Semester 2023/2024

Exercises: Part 1

1. Create two strings with words “slumdog” and “millionaire”. Print them in separate lines and in one line (using `paste`).
2. Create a row vector `a` with the elements $1,3,5,7,11,13,17$ and 19.
3. Generate a column vector `b` with $2,\ldots,2^8$.
4. Generate a column vector `c` with $1,4,9,16,25,\ldots,64$.
5. Find the positions where elements of `b` and `c` coincide (use `which`)
6. Create a matrix `M.c` with the first column vector `b` and the second column vector `c`. Print the dimension and the seventh row of `M.c`.
7. Create a matrix `M.r` with the first row vector `a` and the second row vector `b`. Rename the rows of `M.r` to *a* and *b* and the columns to *S, T, . . . , Y, Z*. (Hint.: These are the last 8 letters of the alphabet.)
8. Print the matrix `M.r` without the column *W*.
9. Print elements of `M.r` larger than 12.
10. Compute the values of the function $y = e^{-x}$ for an equidistant grid from -3 to 3 with an stepwidth of 0.5.
11. Create a vector `d` which contains the numbers from 1 to 100 and another vector `e` which contains 100 elements equal to 7.
12. Create a (10×10) matrix `D` which contains the numbers 1 to 100 (filled by columns) and another (10×10) matrix `E` which contains the numbers $1, \frac{1}{2}, \frac{1}{3}, \ldots, \frac{1}{100}$ (filled by rows).
13. Calculate the the sum $D+E$, the difference $D-E$, the (matrix!) product $D \cdot E$ and the product of elements $(d_{i,j} \cdot e_{i,j})_{i,j=1\ldots10}$.
14. Print the diagonal elements of the matrix $P = D \cdot E$.
15. Compute the difference of the functions $y_1 = x^5 + x^4 + x^3 + x^2 + x + 1$ and $y_2 = 1 + x \cdot (1 + x \cdot (1 + x \cdot (1 + x \cdot (1 + x \cdot (1 + x)))))$ for some x. What is the difference between both methods?
16. Calculate sine and cosine on a grid $[0; 2\pi]$. calculate $\sin / \cos - \tan$, what is the difference?
17. Assuming $\{2,3,5,3,2,5,7,4,2,5\}$ are prices, calculate log returns (by two methods, one using `diff`).
18. From vector $\{1,1,1,1,1,2,2,2,2,3,3,3,3,3,3,3,4,4,4,4,4,4,5,5,5,5,5,5,5,5,5,5,6,6,6,6,6\}$ find the points where values change.

19. Fraction of positive to negative elements in the vector *sin.g*.

20. Define

$$A = \begin{pmatrix} -1.00 & 3.71 & 2.80 & 0.01 & 1.19 \\ 0.40 & -1.81 & -1.96 & 1.84 & 1.74 \\ -4.30 & 1.71 & 0.68 & 0.11 & 3.44 \\ 0.03 & 3.90 & 0.41 & 0.02 & 1.05 \\ 0.24 & -0.01 & 2.10 & 2.87 & -3.57 \end{pmatrix}$$

21. Find the determinant.

22. Find inverse an multiply by the original (test whether we get the Identity matrix).

23. Replace the upper triangles in the following matrices

$$B = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix}$$