Mathematical Foundations of Bioinformatics

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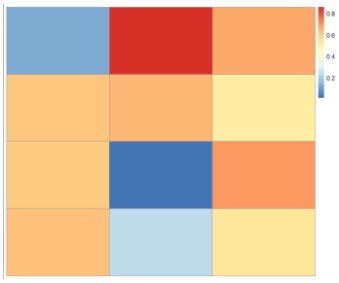
- **Time & Location**: Sundays and Tuesdays 10:00-12:00 at Ghods st. 37, Department of Bioinformatics, IBB, Tehran.

Problem

1. Write a function that receives the array from the input and sorts it without using an array or other auxiliary variable and prints it in the output.

2. Write a function that takes a matrix from the input and draw its heatmap.
   You can use the dichromat library for color and compare it with the ready function in r.



3. Write a function for n function that returns nth Fibonacci number.

   The Fibonacci numbers
   0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

$$F_n = \begin{cases} F_{n-1} + F_{n-2} & n > 1 \\ 1 & n = 1 \\ 0 & n = 0 \end{cases}$$

4. Load the heart data and separate the first 5 columns and change the names of the columns to the following values:
   - Column names: "age", "sex", "cp", "trestbps", "chol"
   - Find the average age of women and men who have blood pressure above 120 separately.
   - Draw a boxplot of blood pressure based on gender and save it in a PDF file.