Pseudocode is a step by step description of an algorithm to be written into a computer program. It is written in a symbolic manner which can be translated into a programming language.

Example: We want to write a program to multiply ten consecutive numbers starting from any natural number. Here is a pseucode for the same.

```
initialise N
P  = N
for i in 1 to 9{
  P = N * (N+i)
}
return P
```

1. Write a pseudocode for computing the coefficients of the interpolating polynomial of degree 5 using the monomial basis from the data points $\{(x_i, y_i) : 0 \le i \le 5\}$.
2. Write a pseudocode for computing the value of the interpolating polynomial of degree 5 from at a point z the data points $\{(x_i, y_i) : 0 \le i \le 5\}$.
3. Perform the R-code on R and explain the output using comments.
   (a) sum and prod command

   ```
   > x = c (1,2,3,4,5)
   > prod(x)
   > prod(x[2:4])
   > sum(x)
   > sum(x[2:4])
   ```

   (b) solve command

   ```
   > b = c(1,17,-3)
   > A = matrix(c(2,4,3,5,1,7,9,8,6), nrow = 3, ncol= 3, byrow = TRUE)
   > x = solve(A,b)
   ```

   (c) Given a matrix A as above can you write a R command to compute the inverse of A ?
4. Consider the following points $\{(x_i, y_i) : 1 \le i \le 6\}$

x	1986	1988	1990	1992	1994	1996
y	113.5	132.2	138.7	141.5	137.6	144.2

   (a) Using the ipcvandermonde.R in the R-code shared folder write a R-code to plot the 5-th degree polynomial interpolating the data in the range of x.
   (b) Using ipvlagrange.R in the R-code shared folder write a R-code to plot the 5-th degree polynomial interpolating the data in the range of x.
   (c) Comment if there a difference between the two polynomials.
5. Consider the function $f : [0, 1] \to [0, 1]$ given by
$$f(x) = \sqrt{x}$$
   (a) Divide the interval into 5 equal points. As in the previous question plot the 5-th degree polynomial that interpolates $\{(x_i, f(x_i)) : 1 \le i \le 6\}$ using the ipcvandermonde.R, ipvlagrange.R on the same plot. Plot $f : \mathbb{R} \to \mathbb{R}$ as well and see if there is a difference.
   (b) Write an R-code called integrate.R that evaluates for $a = (\frac{1}{10}, \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1)$ the
$$\int_0^a f(x)dx$$
   using the midpoint, trapezoid,simpson rules and compare it with the actual value.