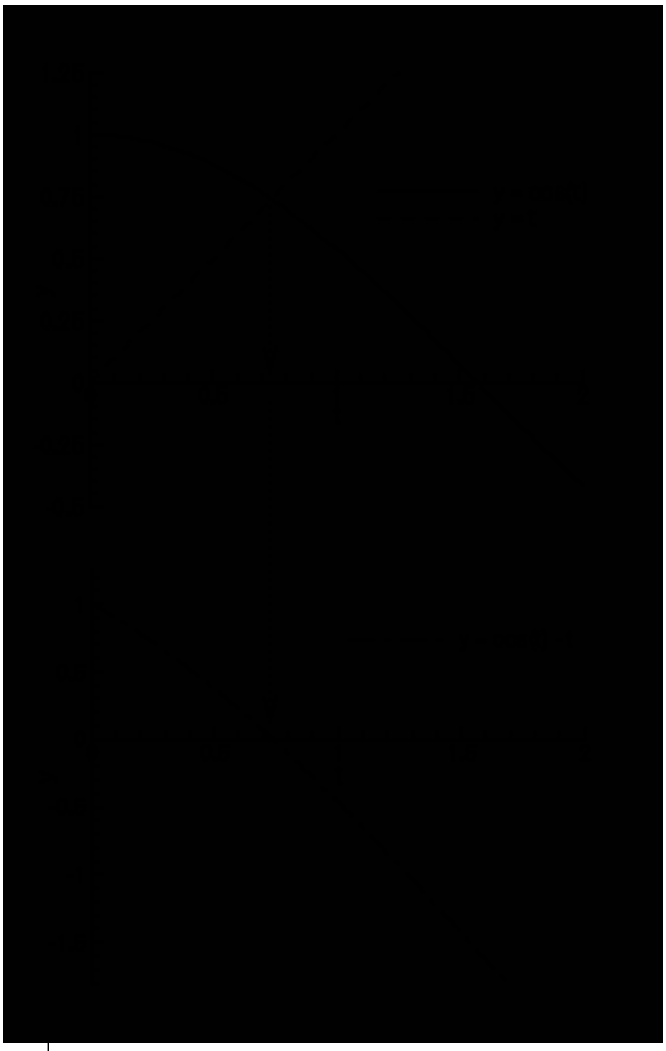
CS-II LAB 3

THE OBJECTIVES:

1. The use of the bisection method to solve the nonlinear equation
2. The use of the secant and Newton methods
3. The investigation how the number of iterations depends on the prescribed accuracy



EXCERSISES:

Write a function **double bisec(double a, double b, double eps, double (*fun)(double))** which calculates a root of a function *fun.

Write a program which solves the nonlinear equation: **`cos(t) = t`** by the bisection method, using the function **`bisec`**

WRITE A PROGRAM WHICH:

- Reads the accuracy **`eps`** (from the keabord),
- Solves the nonlinear equation,
- Shows on the screen the value of the root, the accuracy and the number of performed iterations.

The program should contain the definition of function which describes the nonlinear equation:

```
f(t) = cos(t) - t
```

FURTHER STEPS

1. Modify the program so it performs calculations for all **`eps`** $= 2^{-3}, \ldots, 2^{-20}$.
2. Make the graph showing the „**`number of iterations`**" as a function of **`eps`** (use the log scale).
3. Extend the program to calculate the root also by the secant formula:
   $t_{n+1}=t_n-f(t_n)*(t_n-t_{n-1})/(f(t_n)-f(t_{n-1}))$
   as well as by the Newton's method:
   $t_{n+1}=t_n-f(t_n)/f'(t_n)$
4. Modify the program so it calculates the root of the equation:
   `cos(t) = w*t,` for **`w = 0.5,0.6,...,15`** and **`eps`** $= 10^{-6}$
5. Show in the graph, how the root depends on the parameter **`w.`**