

COMPUTER SCIENCE I

Exercise 7

1. Write a program which will print values of hyperbolic cosinus. In order to do this first write a function calculating values of the hyperbolic cosinus: $\text{ch}(x) = \frac{e^x + e^{-x}}{2}$. The function should have one argument: double x and value of calculated ch(x) should be returned as the value of the function. Then inside a main function calculate the values of ch(x) for 5, 50 and 500 values of x from the range <-2,2>. Use following code:

```
int n = 10;
double a = -2;
double b = 2;
double x;
double h;
h = // ? - find proper step
int k =0;
for( x = a; x <= b; x += h )
{
    k++;
    printf(" x = %12.5lf    ch(x) = %12.5lf \n", x, ch(x) );
}
printf( "loop where done %d times", k );
```

Check how many times the loops were executed and how many times it should be. check the last value of the variable x. Try this after changing type of variables to float.

2. Modify the program such that loop will be executed in unambiguous way.

3. Modify the program by storing the values of x and ch(x) inside arrays. The arrays should be allocated dynamically depending on the value of n. For dynamic allocation use:

```
float *tab = (float*)malloc( n * sizeof(float) );
```

Remember to free allocated memory before exiting the program:

```
free( tab );
```

Create a graph of the ch(x) function inside the Excel.

4. Try following code to see how to use functions inside a logical expression:

```
#include <stdio.h>

int fun1()
{
    printf("calling function 1\n");
    return 1;
}

int fun2()
{
    printf("calling function 2\n");
    return -1;
}

void main()
{
    if( fun1() > 0 || fun2() > 0 )
    {
        printf("one of the functions returned value > 0");
    }
}
```

See the results of the execution of the program after changing order of the functions inside the logical expression used in if statement, using && instead of || and values returned by functions.

5. Try the following code:

```
double x = 0.5, y;
int a = 0;
if( 100 )
    printf( " sqrt(x) = %lf\n", sqrt( x ) );
if( -1 )
    printf( " sin(x) = %lf\n", sin( x ) );
if( a = -5 )
{
    printf( "fabs( a * x ) = %lf", fabs( a * x ) );
    a = 0;
}
if( a == 0 )
    printf( "pow(x,3) = %lf", pow( x, 3 ) );
```

Did the program print all the expected information? Do you know how to write a comparison with == operator in such a way that the operator = (used by mistake) will be treated by compiler as an error?