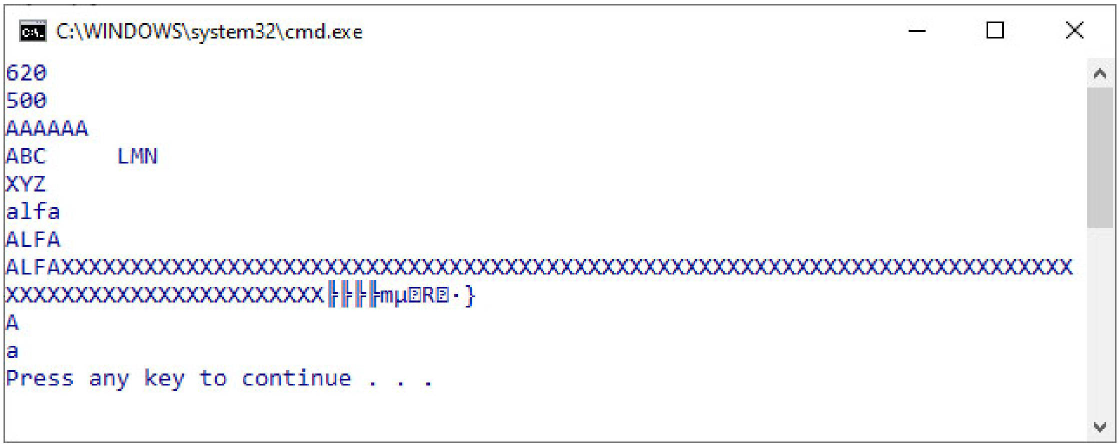
C5 Noţiuni de bază (II)

0) Principii de programare: dezvoltări în serie. (vezi ultima pagină)

1) Scrierea constantelor

```
#include<iostream>
using namespace std;
const int dim = 100;
int main(){
        //constante intregi
        cout << 100 + 100U + 100L + 0100 + 0x100 << endl;

        //constante flotante
        cout << 100.0 + 1e2 + 10000.0e-2 + 100.0F + 100.0L << endl;

        //constante caracter
        cout <<'A' <<'\101' <<'\x41' <<(char)65 <<(char)0101 <<(char)0x41 << endl;

        //constante de tip string
        cout << "ABC\tLMN\nXYZ" << endl;

        //stringuri
        char text[dim] = "alfa";
        cout << text << endl;
        for (int i = 0; i<dim; i++) text[i] = 'X';
        text[0] = 'A';
        text[1] = 'L';
        text[2] = 'F';
        text[3] = 'A';
        text[4] = '\0';
        cout << text << endl;
        text[4] = 'X';
        cout << text << endl;

        cout << text[3] << endl;

        cout << "abc"[0] << endl;
        //"abc"[0]='X';// error C2166: l-value specifies const object

        return 0;
}
```



2) Definiţii şi declaraţii de funcţii (stil C)

-definirea:tip rezultat, parametrii formali (argumente)

-apelarea funcţiilor: parametrii actuali

-declararea fără definire

- apeluri recursive

3) Transmiterea parametrilor catre funcţii şi returnarea rezultatelor

-numai stilul C: prin valoare.

Dezvoltări în serie

1) Error function
https://en.wikipedia.org/wiki/Error_function

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2}\,dt = \frac{2}{\sqrt{\pi}} \left(x - \frac{x^3}{1!\cdot 3} + \frac{x^5}{2!\cdot 5} - \frac{z^7}{3!\cdot 7} + \frac{x^9}{4!\cdot 9} - \cdots \right)$$

Verificare: $\operatorname{erf}(1.0) \cong 0.842700793$ sau $\lim\limits_{x\to+\infty} \operatorname{erf}(x) = 1$.

2) Sinus integral:
https://en.wikipedia.org/wiki/Trigonometric_integral#Sine_integral

$$\operatorname{Si}(x) = \int_0^x \frac{\sin t}{t}\,dt = x - \frac{x^3}{3!\cdot 3} + \frac{x^5}{5!\cdot 5} - \frac{x^7}{7!\cdot 7} + \cdots$$

Verificare: $\operatorname{Si}(1.0) \cong 0.946083070367$ sau $\lim\limits_{x\to+\infty} \operatorname{Si}(x) = \int_0^\infty \frac{\sin t}{t}\,dt = \frac{\pi}{2}$.

3) Arcsin

$$\arcsin(x) = x + \frac{1}{2}\cdot\frac{x^3}{3} + \frac{1\cdot 3}{2\cdot 4}\cdot\frac{x^5}{5} + \frac{1\cdot 3\cdot 5}{2\cdot 4\cdot 6}\cdot\frac{x^7}{7} + \cdots \quad |x| \le 1.$$

4) Arctg

$$\operatorname{arctg} x = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \cdots,\ |x| \le 1.$$

5) Seria binomială. Pentru orice $\alpha \in \mathbb{R}$

$$(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2!}x^2 + \frac{\alpha(\alpha-1)(\alpha-2)}{3!}x^3 + \cdots,\ |x| < 1.$$

Observaţie: binomul lui Newton

$$(1+x)^2 = (1+x)(1+x) =$$

$$1 \cdot 1$$

$$1 \cdot x$$

$$x \cdot 1$$

$$x \cdot x$$

$$= C_2^0 \cdot 1 + C_2^1 \cdot x + C_2^2 \cdot x^2$$

$$(1+x)^3 = (1+x)(1+x)^2 =$$

$$1 \cdot 1 \cdot 1$$

$$1 \cdot 1 \cdot x$$

$$1 \cdot x \cdot 1$$

$$1 \cdot x \cdot x$$

$$x \cdot 1 \cdot 1$$

$$x \cdot 1 \cdot x$$

$$x \cdot x \cdot 1$$

$$x \cdot x \cdot x$$

$$= C_3^0 \cdot 1 + C_3^1 \cdot x + C_3^2 \cdot x^2 + C_3 \cdot x^3$$

$$(1+x)^n = 1+nx+\frac{n(n-1)}{2!}x^2+\frac{n(n-1)(n-2)}{3!}x^3+\cdots+\frac{n(n-1)(n-2)\cdots 1}{n!}x^n, \ \forall x.$$

```
#include<iostream>
using namespace std;

double myPow(double t, double alfa) {
    if (t < 0 || t>2) return 0;
    double x = t - 1;//1+x=t
    double s = 0, p = 1;
    for (int k = 0; k < 100; k++) {
        s += p;
        p *= (alfa - k) * x / (k + 1);
    }
    return s;
}

int main() {
    cout.precision(12);
    double alfa = 0.5;
    double t = 1.3;
    cout << myPow(t, alfa) << endl;;
    cout << pow(t, alfa)<<endl;
    //1.1401754251
    //1.1401754251
    return 0;
}
```