

Introduction to Informatics

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Exercise

- ▶ Generate randomly n natural numbers which are smaller than one hundred. Calculate the followings:
 - sum of the elements
 - count the even elements
 - define the minimum element
 - define the index of the minimum element
- *Help:* we store the randomly generated numbers in an one dimensional array, which we can do in the following way.

```
a[i]=(rand()%99)+1;  
srand(time(NULL));
```

Solution

```
int i, n, sum=0, prod=1, even=0, min=0;
printf("n="); scanf("%d",&n);
int a[n];
for(i=0;i<n;i++)
{
    a[i]=(rand()%99)+1;
    sum+=a[i];
    prod*=a[i];
    if (a[i]%2==0) even++;
    if (a[i]<a[min]) min=i;
}
for(i=0;i<n;i++)
    printf("%d ",a[i]);
printf("\nSum:%dProduct:%d\nEven number:%d\nMinimum element:%d\nIndex:%d\n", sum, prod, even, a[min], min);
```

Exercise

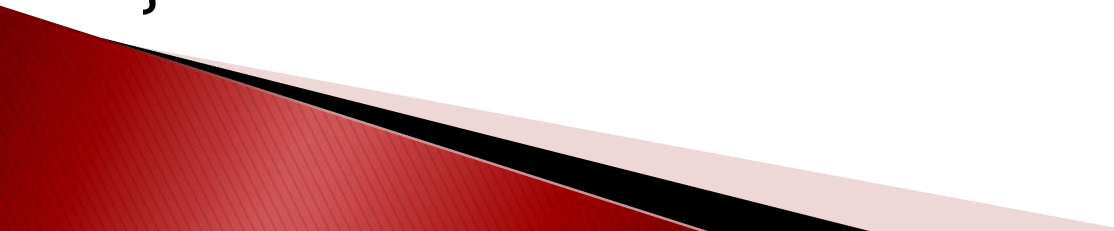
- ▶ Write a function which calculates x^n .

Solution

```
int power(int x, int n)
{
    int i, res = 1;

    for(i = 0; i < n; i++)
        res *= x;

    return res;
}
```



Exercise

- ▶ Write a recursive function which calculate the following sum:

$$\sum_{i=1}^n i^2$$

Solution

```
int sum(int n)
{
    return n > 1 ? n*n + sum(n-1) : 1;
}
```

Exercise

- ▶ Write a recursive function which calculate the following sum:

$$\sum_{i=1}^n i \cdot (i + 1)$$

Solution

```
int sum2(int n)
{
    return n > 1 ? n*(n+1)+sum2(n-1) : 2;
}
```

Two dimensional arrays

- ▶ Table, matrix: rows, columns
 - every element has an index, so that we can refer to them
- ▶ Definition:
 - **type** name[row size][column size];
- ▶ Example:

```
int a[10] [10];  
float b[20] [20];  
char c[30] [30];
```
- ▶ Initialization:

```
int a[2][3]={1,3,5,0,77,-12};  
float b[50][50]={0};
```
- ▶ Reference:

```
name [row_index] [column_index];
```

 Example: `a[2][3];`

Exercise

- ▶ Write a program which inputs from the keyboard an $M \times N$ matrix – which contains integers – into a two dimensional array then prints the elements on the screen in a matrix form.

Solution

```
int i,j, row, column;  
printf(„Give the row and column value: ");  
scanf("%d %d",&row,&column);  
int a[row][column];
```

```
printf(„Give the matrix elements: ");  
    for(i=0; i<row; i++)  
        for(j=0; j<column; j++)  
            scanf("%d",&a[i][j]);
```

```
    for(i=0; i<row; i++) {  
        for(j=0; j<column; j++)  
            printf("%d  ",a[i][j]);  
        printf("\n");}
```

Exercise

Find the mistakes!

```
#include <stdio>
int main
{
    int n;
    print(n=);
    scanf("%d",n);
    for(i=0;;i++);
        if (i=10) break;
        printf("%d ",i,i*i);
    return 0;
}
```

Exercise

What is the result of this code?

```
int n, k, i, x;
scanf("%d", &n);
k = 0; i = 1;
while (i <= n)
{
    scanf("%d", &x);
    if (!(x%2))
        k++;
    i++;
}
printf("%d", k);
```

Exercise

What is the result of this code?

```
int i, j, k;  
i=-2; j=-5; k=1;  
if (i!=j || k)  
    k=-6 * (--i || j);  
else  
    k=-7 * (i++ && k);  
printf("%d\t%d\t%d\n",i,j,k);
```

Exercise

What is the result of this code?

```
int i=-5, j=0, k=10;  
    if (k>=j||i&&j)  
        {i++; j+=k;}  
    else  
        k*=i+j--;  
    printf("i=%d\tj=%d\tk=%d\n",i,j,k);
```


Exercise

What is the result of this code?

```
int i, j, k;  
i = -3; j = -1; k = 0;  
if (i == j || k)  
    k = -4 * (++i || j);  
else  
    k = -3 * (i && k);  
printf("%d\t%d\t%d\n", i, j, k);
```

Exercise

What is the result of this code?

```
int c1 = 12, c2 = 45;  
    c1 ^= c2;  
    c2 ^= c1;  
    c1 ^= c2;  
printf("c1 = %X\tc2 = %X", c1, c2);
```

Exercise

What is the result of this code?

```
double a=5.12, b=42.23;  
    a-=b;  
    b+=a;  
    a=b-a;  
printf("\na= %lf \nb= %.3lf",a,b);
```

Exercise

What is the result of this code?

```
double a=25.4782, b=-34.2;  
    a+=b;  
    b=a-b;  
    a-=b;  
printf("\na= %lf \nb= %.3lf",a,b);
```

Exercise

What is the result of this code?

```
double a=-2536.234, b=-547.4;  
double k;  
    k=a;  
    a=b;  
    b=k;  
printf("\na= %.4lf \nb= %.1f",a,b);
```

Exercise

What is the result of this code?

```
int a, k;  
    scanf("%d",&a);  
    k= a ? 0 : 1;  
    while (a){  
        a=a/10;  
        k++;  
    }  
    printf("%d\n",k);
```

Exercise

What is the result of this code?

```
int k = 4, *p;
```

```
p=&k;
```

```
*p=12*k+*p+55;
```

```
printf("%d\t%X\t%X\t%d\n",k+5,p,p+2,*p+2);
```

Exercise

What is the result of this code?

```
int i;  
for(i=10;i>0;i--);  
    printf("%d ",i);
```


Exercise

What is the result of this code?

```
int i=18;  
    while (!i)  
        i--;  
printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int k=1, j=0, i = 0;
while (i<=120)
    if (i=1)
        j=k++;
    else
        i++;
printf("j=%d\ti=%d\n",j,i);
```

Exercise

What is the result of this code?

```
int b, d;  
d=0x72; b=0x3C;  
b ^= (1 << 3);  
d &= (5 << 5);  
printf(" b=%x\n d=%x\n", b, d);
```

Exercise

What is the result of this code?

```
double m [3][5]={5.5,7.9,5,7,34,10,11,-5,0,  
6.2,0,15,5,5,55.5,3};  
printf("%.3lf , %lf \n", m[2][1], m[1][3] );
```

Exercise

What is the result of this code?

```
int a = 0xAF, b = 0xB3, c = 0xD5;  
    c &= b << 3;  
    b ^= a >> 1;  
printf("%X %X \n", c, b);
```

Exercise

What is the result of this code? Work with the newly calculated values.

```
int a, b, c;  
a = b = c = 8;  
b = ++b - (a%2);  
c = c < a ? a-2 : b/2;  
b+=a; a%=2; c--;
```

Exercise

What is the result of this code?

```
int B[25], i=0;  
for ( ; i < 10; ++i )  
    B[i] = 4*(2*i+1);  
printf("%d\n%d\n", *(B+11), B[i-7]);
```

Exercise

What is the result of this code?

```
i=1; j=2; k=3; k-=+i-j--;
```

```
i=3; j=1; k=4; k+=--i+--j;
```

```
i=1; j=4; k=3; k/=-i++-j--;
```

```
i=2; j=2; k=1; k*=-i+++j--;
```

```
i=5; j=3; k=2; k%=--i+j++;
```


Exercise

What is the result of this code?

```
int i=7;  
while (i=8) i++;  
    printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=7;  
while (i=0) i++;  
    printf("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=5;  
for (; i!=10; i++);  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int i=5;  
for (; i!=10; i++)  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int i;  
for (i=1; i!=10; i++)  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int i;  
for (i=1; i!=10; i++);  
    printf ("%d\n",i);
```

Exercise

What is the result of this code?

```
int B[40], i=0;  
for ( ; i < 30; ++i )  
    B[i] = 2*i+2;  
printf("%d\n%d\n", *(B+2), B[i-1 2]);
```

Exercise

What is the result after the execution of this code?

```
int n=11;  
printf("E= %d \n", !(n&(1<<3)));
```


Exercise

What is the result of this code?

```
int m=2;  
char b=-8;  
double a,d=3.25;  
a = (int)(b-m*d);  
printf("%.2f\t%d\n",a,(char)d);
```

Exercise

What is the result of this code?

```
double a1=1.0, b1=4.0, s;  
s = a1 + 1/b1 * 3 + 64;  
printf("%o\n",(char)s);  
printf("%d\n",(char)s);
```