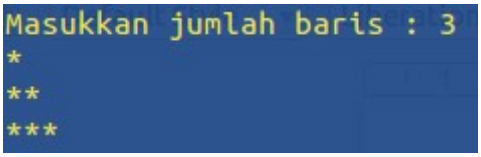
Latihan 1

```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (s=1; s<=awal; ++s)
        {   cout << "*";    }

        cout << endl;
    }
}
```

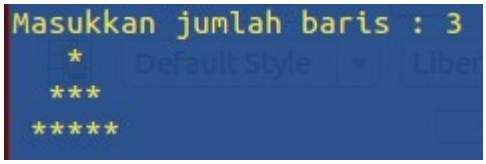


Latihan 2

```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (s=baris; s>=awal; --s)
        {   cout << "*";    }

        cout << endl;
    }
}
```

Latihan 3

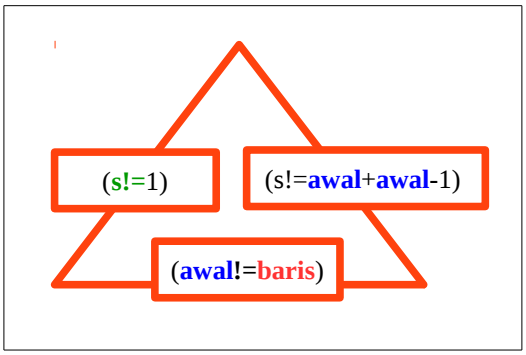
```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, p, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (p=baris; p>=awal; --p)
        {   cout << " ";  }

        for (s=1; s<=awal+awal-1; ++s)
        {   cout << "*";    }

        cout << endl;
    }
}
```



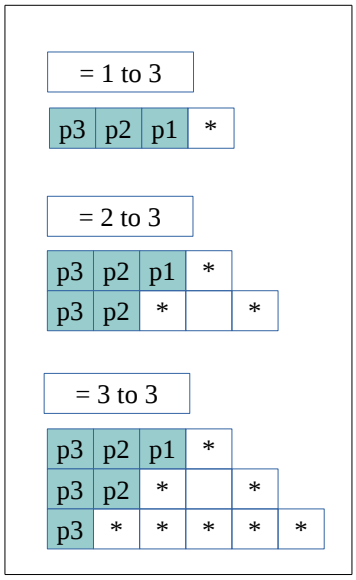
Latihan 4

```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, p, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (p=1; p<=awal; ++p)
        {   cout << " ";  }

        for (s=baris+baris-awal; s>=awal; --s)
        {   cout << "*";    }

        cout << endl;
    }
}
```

Latihan 5

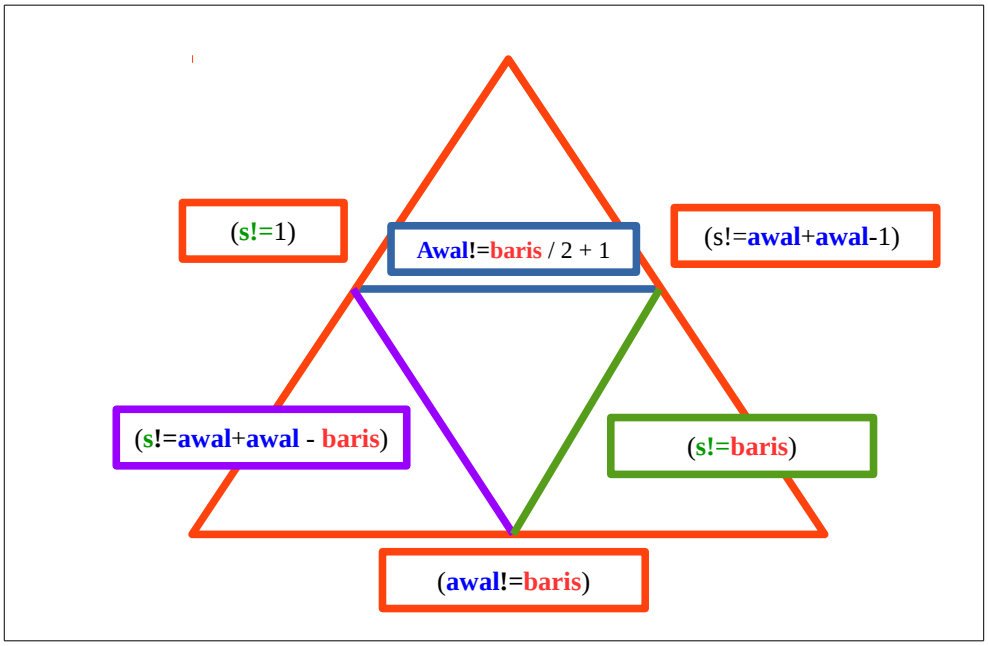



```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, p, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (p=baris; p>=awal; --p)
        {   cout << " "; }

        for (s=1; s<=awal+awal-1; ++s)
        {
            if( (s!=1)  && (s!=awal+awal-1) && (awal!=baris) )
                cout << " ";
            else
                cout << "*";
        }

        cout << endl;
    }
}
```



Latihan 6

```
#include <iostream>
using namespace std;
int main()
{
    int baris, awal, p, s;
    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for (awal=1; awal<=baris; ++awal)
    {
        for (p=baris; p>=awal; --p)
        {   cout << " ";  }

        for (s=1; s<=awal+awal-1; ++s)
        {
            if( (s!=1)  && (s!=awal+awal-1) && (awal!=baris) &&
                (awal!=baris / 2+1) && (s!=baris) && (s!=awal+awal-baris) )
                cout << " ";
            else
                cout << "*";
        }

        cout << endl;
    }
}
```



Latihan 7

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

int main()
{
    int row, col, a, b;
    cout << "Amount of row : "; cin >> row;
    cout << "Amount of col : "; cin >> col;

    for (a=1; a<=row; a++)
    {
        for (b=1; b<=col; b++)
        {
            if((a==1)||(a==row)||(b==1)||(b==col))
                cout << "*" << " ";
            else
                cout << " " << " ";
        }
        cout << "\n";
    }
}
```

```
Amount of row : 4
Amount of col : 4
* * * *
*     *
*     *
* * * *
```

a==1, b==1, b==col, a==row

1,1	1,2	1,3	1,4
2,1	2,2	2,3	2,4
3,1	3,2	3,3	3,4
4,1	4,2	4,3	4,4

Latihan 8

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

int main()
{
    int baris, awal, p, s, q;

    cout << "Masukkan jumlah baris : ";
    cin >> baris;

    for(awal=1; awal<=baris; awal++)
    {
        for(p=1; p<=awal; p++)    cout << "*";
        for(s=baris+baris-awal; s>=awal+1; s--) cout << ".";
        for(q=1; q<=awal; q++) cout << "*";
        cout << "\n";
    }
}
```

```
Masukkan jumlah baris : 3
*....*
**..**
******
```

```
baris = 3
for (awal = 1; awal<= 3)
{
    for (p = 1; p<=1) cetak *
        (1 ke 1)
    for (s = baris+baris-awal; s>=awal+1)
        (s = 3+3-1 ke s>= 1+1)
        (5  ke  2) cetak titik 4x
    for (q = 1; q<=1;) cetak *
        (1 ke 1)
}
```

5 4 3 2

```
* . . . . *
```

```
baris = 3
for (awal = 2; awal<=3)
{
    for (p = 1; p<=2) cetak **
        (1 ke 2)
    for (s = baris+baris-awal; s>=awal+1)
        (s = 3+3-2 ke 2+1)
        (4 ke  3) cetak titik 2x
    for (q = 1; q<= 2;) cetak **
        = 1 ke 2
}
```

```
* . . . . *
* * . . * *
```

4 3

```
baris = 3
for (awal = 3; awal<=3)
{
    for (p = 1; p<=3) cetak ***
        (1 ke 3)
    for (s = baris+baris-awal; s>= awal+1)
        (s = 3+3-3 ke 3+1)
        (3 ke 4) → tidak bisa jangan cetak titik
    for (q = 1; q<=3) cetak ***
        (1 ke 3)
```

```
* . . . . *
* * . . * *
* * * * * *
```

Latihan 9

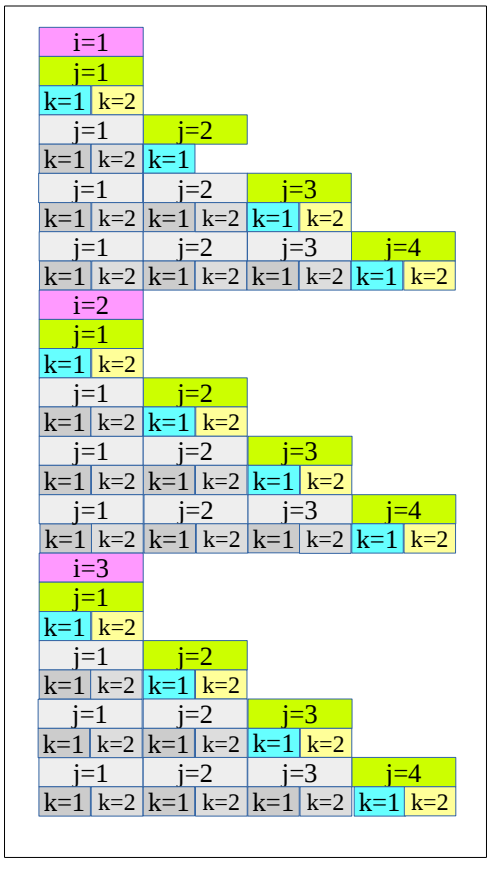
```
#include <iostream>
using namespace std;
int main ()
{
    int baris;
    int z,p,c;

    cout << "Jumlah baris : ";
    cin >> baris;
    c=1;

    for(z=1; z<=baris; z++) //row 0,1,2
    {
        for(p=1; p<=z; p++) //row0=0; row1=0,1; row2=0,1,2
        {
            cout << c++ << "  ";
        }
        cout << "\n";
    }
}
```

```
Jumlah baris : 3
1
2  3
4  5  6
```

Latihan 10a

```
#include <iostream>
using namespace std;
int main ()
{
    int i, j, k;

    for (i=1; i<=3; i++)
    {
        for (j=1; j<=4; j++)
        {
            for (k=1; k<=2; k++)
            {
                cout << k << " ";
            }

            cout << "\n";
        }

        cout << "\n";
    }
}
```

```
RUN

1 2
1 2
1 2
1 2

1 2
1 2
1 2
1 2

1 2
1 2
1 2
1 2
```



Latihan 10b

```
#include <iostream>
using namespace std;
int main ()
{
    int i, j, k;

    for (i=1; i<=3; i++)
    {
        for (j=1; j<=4; j++)
        {
            for (k=1; k<=2; k++)
            {
                cout << j << " ";
            }

            cout << "\n";
        }

        cout << "\n";
    }
}
```

```
RUN

1 1
2 2
3 3
4 4

1 1
2 2
3 3
4 4

1 1
2 2
3 3
4 4
```

```
#include <iostream>
using namespace std;
int main ()
{
    int i, j, k;

    for (i=1; i<=3; i++)
    {
        for (j=1; j<=4; j++)
        {
            for (k=1; k<=2; k++)
            {
                cout << i << " ";
            }

            cout << "\n";
        }

        cout << "\n";
    }
}
```

```
RUN

1 1
1 1
1 1
1 1

2 2
2 2
2 2
2 2

3 3
3 3
3 3
3 3
```

Latihan 11

```
#include <iostream>
using namespace std;
int main ()
{
    int num[100];
    int k,s;

    cout << "Number of array : ";      cin >> k;

    cout << "--Enter value of arrays--\n";
    for (s=1; s<=k; s++)
    {   cout << s << " : "; cin >> num[s];        }

    cout << "Your arrays -> ";
    for(s=1; s<=k; s++)
    {   cout << num[s];   }
}
```

```
RUN

Number of array : 4
--Enter value of arrays--
1 : 2
2 : 4
3 : 2
4 : 4
Your arrays -> 2424
```

Latihan 12

```
#include <iostream>
using namespace std;
int main ()
{
    int s, p, x, y, k, c;

    cout << "Enter number : "; cin >> p;
    cout << "Number to cut : "; cin >> s;
    c = p;

    for (x=c; x>=1; x--) // cetak 9 - 1
    {
        if (x == s) // jika ketemu 5
            for (k=1; k<=p; k++)
            cout << k; // cetak 1-9
        else //jika tidak ketemu angka 5
            for (y=1; y<=p; y++) //jika tidak ketemu angka 5
                if (y==s) //jk y=5
                    cout << x; //cetak 9
                else
                    cout << " ";
        cout << "\n";
    }
}
```

```
Enter number : 9
Number to cut : 7
        9
        8
123456789
        6
        5
        4
        3
        2
        1
```

9
8
7
6
5
4
3
2
1

9
8
7
6
123456789
4
3
2
1

****9****
****8****
****7****
****6****
123456789
****4****
****3****
****2****
****1****

123456789
****8****
****7****
****6****
123456789
****4****
****3****
****2****
****1****

Jika bintang baris pertama digantikan angka
maka angka 9 tepat berada
di deretan 5 dari kiri ke kanan

Latihan 13

```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

```
#include <iostream>
using namespace std;
int main ()
{
    int z;
    int angka[16] = {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15};

    for(z=1; z<=15; z++) //row 0,1,2
    {
            cout << angka[z-1] << " ";
            if ( (z==1) || (z==3) || (z==6) || (z==10) )
            cout << "\n";
    }
}
```

Latihan 14

```
#include <iostream>
using namespace std;
int main ()
{
    int num[100];
    int k,s,w,o;

    w=1;
    o=0;
    cout << "Number of array : ";     cin >> k;

    cout << "--Enter value of arrays--\n";
    for (s=1; s<=k; s++)
    {   cout << s << " : "; cin >>num[s];        }

    cout << "Your arrays -> \n";
    for(s=1; s<=k; s++)
    {
        if (s==w)
        {
            cout << num[s];
            cout << "\n";
            o++;
            w=s+1+o;
        }
        else
            cout << num[s];
    }
}
```

```
Number of array : 6
--Enter value of arrays--
1 : 2
2 : 3
3 : 6
4 : 5
5 : 2
6 : 1
Your arrays ->
2
36
521
```

```
w=1; o=0;
for s=1; s<=6; s++ → loop 1,2,3,4,5,6
{
    if (s=w) → 1=1 sama
    {
        cetak 2 pindah baris
        o++ → o = 1
        w=s+1+o →w = 1+1+1 = 3
    }
}
w=3; o=1
for s=2; s<=6; s++ → loop 1,2,3,4,5,6
{
    if (s=w) → 2=3 tidak sama
    {   jangan proses }
    else
        cetak 3
}
w=3; o=1
for s=3; s<=6; s++ → loop 1,2,3,4,5,6
{
    if(s=w) → 3=3 sama
    {
        cetak 6 pindah baris
        o++ → o = 2
        w=s+1+o → w = 3+1+2 = 6
    }
}
w=6; o=2
for s=4; s<=6; s++
{
    if(s=w) → 4=6 tidak sama
    { jangan proses }
    else
        cetak 5
}
w=6; o=2
for s=5; s<=6; s++
{
    if(s=w) → 5=6 tidak sama
    { jangan proses }
    else
        cetak 2
}
w=6; o=2
for s=6; s<=6; s++
{
    if(s=w) → 6=6  sama
    {
        cetak 1 pindah baris
        o++ → o = 3
        w=s+1+o → w = 6+1+3 = 10
    }
}
```

Latihan 15 (cari FPB)

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

int seku,a,b;

void fpb(int a,int b)
{
    int mfpb;
    mfpb = 0;
    for(seku=a; seku>=1; seku--)
    {
        if((a % seku==0)&&(b % seku==0))
            {
                mfpb = mfpb+1;
                if(mfpb==1)
                    cout << "FPB : " << seku;
            }
    }
}

int main()
{
    cout << "Number 1 : "; cin >> a;
    cout << "Number 2 : "; cin >> b;
    fpb(a,b);
}
```

Variabel global

RUN

```
Number 1 : 8
Number 2 : 12
FPB : 4
```

```
a = 3 ; b = 7
void fpb(int 3, int 7)
{
mfpb = 0
for seku = a; seku >=1; seku-- → 3 ke 1
    {
        if ((a % seku=0) && (b % seku=0)) then
           3 % 3 =0 → ya && 7 % 3=1 → tidak
           3 % 2 =1 → tidak && 7 % 2=1 → tidak
           3 % 1 =0 → ya && 7 % 1=0 → ya
            { → karena ya keduanya maka
              mfpb := 0 + 1 → = 1
              if mfpb = 1 then cetak seku → 1
            }
    }
}
```

FPB dari 4,8 (Faktor Persekutuan Terbesar)
4 = 1, 2, 4 **(nilai 4 bisa dibagi dengan semua nilai ini)**
8 = 1, 2, 4, 8 **(nilai 8 bisa dibagi dengan semua nilai ini)**
nilai yang sama dari 4,8 adalah **1,2,4** dan yang terbesar adalah **4** diambil sebagai FPB.

Latihan 16 (cari KPK)

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

int seku,a,b;

void kpk(int a,int b)
{
    int mkpk;
    mkpk = 0;
    for(seku=a; seku<=(a*b); seku++)
    {
        if((seku % a==0)&&(seku % b==0))
            {
                mkpk = mkpk+1;
                if(mkpk==1)
                    cout << "KPK : " << seku;
            }
    }
}

int main()
{
    cout << "Number 1 : "; cin >> a;
    cout << "Number 2 : "; cin >> b;
    kpk(a,b);
}
```

```
a = 3 ; b = 7
function kpk(3, 7 : integer) : integer;
begin
kpk = 0
for seku = a to (a*b) do → 3 to (3*7) → 3 to 21
begin
      if ((seku % a=0) && (seku % b=0)) then
            3  % 3 = 0 → ya && 3 % 7 = 3 → tidak
            4 % 3 = 1 → tidak && 4 % 7 = 4 → tidak
            5 % 3 = 2 → tidak && 5 % 7 = 5 → tidak
            6 % 3 = 0 → ya && 6 % 7 = 6 → tidak
            7 % 3 = 1 → tidak && 7 % 7 = 0 → ya
            8 % 3 = 2 → tidak && 8 % 7 = 1 → tidak
            9 % 3 = 0 → ya && 9 % 7 = 2 → tidak
           10 % 3 = 1 → tidak && 10 % 7 = 3 → tidak
           11 % 3 = 2 → tidak && 11 % 7 = 4 → tidak
           12 % 3 = 0 → ya && 12 % 7 = 5 → tidak
           13 % 3 = 1 → tidak && 13 % 7 = 6 → tidak
           14 % 3 = 2 → tidak && 14 % 7 = 0 → ya
           15 % 3 = 0 → ya && 15 % 7 = 1 → tidak
           16 % 3 = 1 → tidak && 16 % 7 = 2 → tidak
           17 % 3 = 2 → tidak && 17 % 7 = 3 → tidak
          18 % 3 = 0 → ya && 18 % 7 = 4 → tidak
          19 % 3 = 1 → tidak && 19 % 7 = 5 → tidak
          20 % 3 = 2 → tidak && 20 % 7 = 6 → tidak
          21 % 3 = 0 → ya && 21 % 7 = 0 → ya
          begin→ karena ya keduanya maka
             kpk = 0 + 1 → = 1
             if kpk = 1 cetak seku → 21
           end
end
end
```

KPK dari 4,8 (Kelipatan Persekutuan Tekecil)
4 = 4, **8**, 12, **16**, 20, **24**, 28 **(angka berikut tambahkan dengan angka awal)**
8 = **8**, **16**, **24**, 32, 40, 48, 56
nilai sama awal/terkecil dari **8, 16, 24** adalah **8** dan diambil sebagai KPK

Latihan 17 (mencari kelipatan)

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


int main()
{
    int angka[10];
    int ff,mm,gg,jlh,s,k,lipat;

    cout << "Masukkan banyaknya angka : "; cin >> jlh;

    for(ff=1; ff<=jlh; ff++)
    {
        cout << "Angka" << ff << " : ";
        cin >> angka[ff];
    }
    cout << endl;

    cout << "Berapa kali kelipatan yang diinginkan : ";
    cin >> lipat;

    for(mm=1; mm<=jlh; mm++)
    {
        s=angka[mm]; //s = array[loop] → 4[1], 8[2], 12[3]
        k=0; //tampung sementara s
        for(gg=1; gg<=lipat; gg++)
        {
            s=k+angka[mm]; //s=0+4, s=4+4, s=8+4 (loop1)
            k=s; //k=4, k=8, k=12 (loop1)
            if(gg < lipat) //jk looping < 3 cetak angka,koma
                if(k==angka[mm]) //jk kelipatan=4[1],8[2],12[3]
                    cout << k << " : "; //cetak 4 : , 8 : , 12 :
                else
                    cout << k << ",";
            else
                cout << k;
        }
        cout << endl;
    }
}
```

Masukkan banyaknya angka : 3

Angka 1 : 4
Angka 2 : 8
Angka 3 : 12

Berapa kali kelipatan yang diinginkan : 3

RUN

Masukkan banyaknya angka : 3
Angka 1 : 4
Angka 2 : 8
Angka 3 : 12

Berapa kali kelipatan yang diinginkan : 3
4 : 8,12,16
8 : 16,24,32
12 : 24,36,48

```
for mm = 1; mm<= jlh → 1 ke 3
    {
        s = angka[mm] → 4 ; k = 0
        for gg = 1; gg<= lipat → 1 ke 3
            {
                s = k+angka[mm] → s = 0+4 = 4
                k = s → k = 4→ cetak 4
            }
        for gg = 2; gg<=lipat → 2 ke 3
            {
                s = k+angka[mm] → s = 4+4 = 8
                k = s → k = 8→ cetak 8
            }
        for gg = 3; gg<=lipat → 3 ke 3
            {
                s = k+angka[mm] → s = 8+4 = 12
                k = s → k = 12 → cetak 12
            }
    }
for mm = 2; mm<=jlh → 2 ke 3
    {
        s = angka[mm] → 8 ; k = 0
        for gg = 1; gg<=lipat → 1 ke 3
            {
                s = k+angka[mm] → s = 0+8 = 8
                k = s → k = 8 → cetak 8
            }
        for gg = 2; gg<=lipat → 2 ke 3
            {
                s = k+angka[mm] → s = 8+8 = 16
                k = s → k = 16→ cetak 16
            }
        for gg = 3; gg<=lipat → 3 ke 3
            {
                s = k+angka[mm] → s = 16+8 = 24
                k = s → k = 24 → cetak 24
            }
    }
for mm = 3; mm<=jlh → 3 ke 3
    {
        s = angka[mm] → 12 ; k = 0
        for gg = 1; gg<=lipat → 1 ke 3
            {
                s = k+angka[mm] → s = 0+12 = 12
                k = s → k = 12 → cetak 12
            }
        for gg = 2; gg<=lipat → 2 ke 3
            {
                s = k+angka[mm] → s = 12+12 = 24
                k = s → k = 24 → cetak 24
            }
        for gg = 3; gg<=lipat → 3 ke 3
            {
                s = k+angka[mm] → s = 24+12 = 36
                k = s → k = 36 → cetak 36
            }
    }
```

Latihan 18 (menjalankan fungsi lain pada fungsi yang sedang berjalan)

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

int gembel(int x, int y)
    {
        int gem;
        if(y==0)
            return(gem=x);
        else
            return(gem=gembel(y,x % y));
    }

int wedhus(int n)
    {
        int pedhet;
        int i;
        int wed;
        pedhet=0;
        for(i=n-1; i>=1; i--)
        {
            if(gembel(n,i)==1)
                pedhet=pedhet+1;
        }
        return (wed=pedhet);
    }

int main ()
{
    cout << wedhus(35);
}
```

gembel(3,2)
{
if y = 0 **salah karena y=2**
gembel = gembel(y,x % y) **jalankan if ini**
=gembel(2,3 % 2)
=gembel(2,1)
}

gembel(2,1)
{
if y = 0 **salah karena y=1**
gembel = gembel(y,x % y) **jalankan if ini**
=gembel(1,2 % 1)
=gembel(1,0)
}

gembel(1,0)
{
if y = 0 **benar**
gembel = x **jalankan if ini**
=1
}

n = 3
{
pedhet = 0;
for (i = n-1; i>= 1; i--)
= 3-1 ke 1
for (i = 2; i>=1; i--)
{
if gembel(n,i) = 1
gembel(3,2) = 1 **ya**
pedhet = pedhet + 1;
= 0 + 1
= 1
}
wedhus = pedhet;
= **1**
}

gembel(3,1)
{
if y = 0 **salah karena y=1**
gembel = gembel(y,x % y) **jalankan if ini**
=gembel(1,3 % 1)
=gembel(1,0)
}

gembel(1,0)
{
if y = 0 **benar**
gembel = x **jalankan if ini**
=1
}

n = 3
{
pedhet = 1
for (i = 1; i>= 1; i--)
{
if gembel(n,i) = 1
gembel(3,1) = 1 **ya**
pedhet = pedhet + 1;
= 1 + 1
= 2
}
wedhus = pedhet;
= **2**
}

wedhus(3) = 2

Latihan 19a (faktorial menggunakan fungsi yang mengembalikan nilai/return value)

```
#include <iostream>
using namespace std;
int factorial(int fac)
{
    int facto=1;
    while (fac > 1)
    {
        facto=facto*fac;
        fac--;
        cout  << facto << " * " << fac << " = " << facto * fac << "\n";
    }
    return facto;
}

int main()
{
    int fac;

    cout << "Enter number : "; cin >> fac;
    cout << "Factorial : " << factorial(fac);
}
```

RUN

```
Enter number : 6
6 * 5 = 30
30 * 4 = 120
120 * 3 = 360
360 * 2 = 720
720 * 1 = 720
Factorial : 720
```

Latihan 19b (faktorial menggunakan fungsi yang tidak mengembalikan nilai/void)

```
#include <iostream>
using namespace std;
void factorial(int fac)
{
    int facto=1;
    while (fac > 1)
    {
        facto=facto*fac;
        fac--;
        cout << facto << " * " << fac << " = " << facto * fac << "\n";
    }
    cout << "Factorial : " << facto;
}

int main()
{
    int fac;

    cout << "Enter number : "; cin >> fac;
    factorial(fac);
}
```

RUN

```
Enter number : 6
6 * 5 = 30
30 * 4 = 120
120 * 3 = 360
360 * 2 = 720
720 * 1 = 720
Factorial : 720
```

Latihan 20a (memecahkan uang ke satuan yang lebih kecil = cara panjang)

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

int main()
{
    long pecahan[10];
    long uang_pecahan[10];
    long uang, simpan;

    pecahan[1] = 1;
    pecahan[2] = 2;
    pecahan[3] = 5;
    pecahan[4] = 10;
    pecahan[5] = 20;

    cout << "Masukkan uang : "; cin >> uang;
    simpan = uang;

    uang_pecahan[5] = simpan / pecahan[5];
    simpan = simpan % pecahan[5];
    uang_pecahan[4] = simpan / pecahan[4];
    simpan = simpan % pecahan[4];
    uang_pecahan[3] = simpan / pecahan[3];
    simpan = simpan % pecahan[3];
    uang_pecahan[2] = simpan / pecahan[2];
    simpan = simpan % pecahan[2];
    uang_pecahan[1] = simpan / pecahan[1];
    simpan = simpan % pecahan[1];

    cout << "uang pecahan 20 ada : " <<uang_pecahan[5] << "\n";
    cout << "uang pecahan 10 ada : " << uang_pecahan[4] << "\n";
    cout << "uang pecahan 5 ada : " << uang_pecahan[3] << "\n";
    cout << "uang pecahan 2 ada : " << uang_pecahan[2] << "\n";
    cout << "uang pecahan 1 ada : "<< uang_pecahan[1] << "\n";
}
```

RUN

```
Masukkan uang : 39
uang pecahan 20 ada : 1
uang pecahan 10 ada : 1
uang pecahan 5 ada : 1
uang pecahan 2 ada : 2
uang pecahan 1 ada : 0
```

```
uang = 39
simpan = uang
       = 39

uang_pecahan[5] = simpan / pecahan[5]
                = 39 / 20
                = 1
simpan = simpan % pecahan[5]
       = 39 % 20
       = 19

uang_pecahan[4] = simpan / pecahan[4]
                = 19 / 10
                = 1
simpan = simpan % pecahan[4]
       = 19 % 10
       = 9

uang_pecahan[3] = simpan / pecahan[3]
                = 9 / 5
                = 1
simpan = simpan % pecahan[3]
       = 9 % 5
       = 4

uang_pecahan[2] = simpan / pecahan[2]
                = 4 / 2
                = 2
simpan = simpan % pecahan[2]
       = 4 % 2
       =  0

uang_pecahan[1] = simpan / pecahan[1]
                = 0 / 1
                = 0
simpan = simpan % pecahan[1]
       = 0 % 0
       = 0

Uang pecahan 20 ada : uang_pecahan[5]
                    : 1
Uang pecahan 10 ada    : uang_pecahan[4]
                    : 1
Uang pecahan 5 ada : uang_pecahan[3]
                    : 1
Uang pecahan 2 ada : uang_pecahan[2]
                   : 2
Uang pecahan 1 ada : uang_pecahan[1]
                    : 0
```

Latihan 20b (memecahkan uang ke satuan yang lebih kecil = cara pendek)

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

int main()
{
    long pecahan[10];
    long uang_pecahan[10];
    long uang, simpan;
    long ss, cc;

    pecahan[1] = 1;
    pecahan[2] = 2;
    pecahan[3] = 5;
    pecahan[4] = 10;
    pecahan[5] = 20;

    cout << "Masukkan uang : "; cin >> uang;
    simpan = uang;

    for(cc=5; cc>=1; cc--)
    {
        uang_pecahan[cc] = simpan / pecahan[cc];
        simpan = simpan % pecahan[cc];
    }

    for(ss=5; ss>=1; ss--)
        cout << "Uang pecahan " << pecahan[ss] << " ada : " << uang_pecahan[ss] << "\n";
}
```

RUN

```
Masukkan uang : 34
Uang pecahan 20 ada : 1
Uang pecahan 10 ada : 1
Uang pecahan 5 ada : 0
Uang pecahan 2 ada : 2
Uang pecahan 1 ada : 0
```

Latihan 21 (mencari spasi pada kalimat)

```
#include <iostream>
using namespace std;
int main()
{
    int c,d;
    string b;

    b="sepeda tua";
    c=b.length();
    for (d=0; d<=c; d++)
    {
        if(isspace(b[d]))
        {
            cout << "It's space";
            cout << "\n";
        }
        else    cout << b[d] << "\n";
    }
}
```

RUN

```
s
e
p
e
d
a
It's space
t
u
a
```

Latihan 22 (mencetak array string)

```
#include <iostream>
using namespace std;
int main()
{
    int jkal, rool;
    string kal[200];

    cout << "Masukkan banyak kalimat : "; cin >> jkal;
    cout << "\n";
    cin.ignore(); // jk tidak ada maka getline langsung rool 2

    for(rool=1; rool<=jkal; rool++)
    {
        cout << "Masukkan kalimat " << rool << " : ";
        getline(cin, kal[rool]);
    }
    cout << "\n";

    for(rool=1; rool<=jkal; rool++)
        cout << kal[rool] << "\n";
}
```

cin.ignore();
Penting agar for untuk cin dan for untuk cout berjalan normal

RUN

```
Masukkan banyak kalimat : 3

Masukkan kalimat 1 : sepeda tua
Masukkan kalimat 2 : mobil tua
Masukkan kalimat 3 : motor tua

sepeda tua
mobil tua
motor tua
```

Latihan 23 (memisahkan kalimat berdasarkan kata)

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

void aa(string kk)
{
    int ii, ss;
    char pp;

    ss=kk.length(); //ss = strlen(kk);
    pp = ' ';

    for(ii=0; ii<ss; ii++)
    {
            if(kk[ii] == pp)
                cout << endl;
            else
            {   cout << kk[ii];  }
    }
}

int main()
{
    string kk; //char kk[1000];
    cout << "Enter sentences : "; getline(cin,kk); //cin.getline(kk,sizeof(kk));
    aa(kk);
}
```

RUN

```
Enter sentences : sepeda tua
sepeda
tua
```

Latihan 24 (jumlah semua angka yang diinput)

```
#include <iostream>
#include <sstream> //ostringstream &  istringstream
using namespace std;

string convertinttostr(int yy)
{
    string bb;

    ostringstream wek; //stream wek digunakan untuk konversi
    wek << yy; //masukkan int aa ke stream wek
    bb = wek.str(); //string bb sebagai penampung stream wek
    return(bb); //kirim kembali string bb ke main function
}

int convertstrtoint(string zz)
{
    int bb;

    istringstream wek(zz); //stream wek digunakan untuk konversi
    if(!(wek >> bb)) //kirim wek ke int bb
        bb = 0; //jika gagal hasil = 0 (contoh string ='12345'  bukan  'sepeda')
    return(bb); //kembalikan hasil ke main function
}

int main()
{
    int aa;
    string result;
    int cc;
    int hit, kk, sum;
    string jj;

    cout << "Enter number 0-9 : "; cin >> aa; //input integer

    result = convertinttostr(aa); //konversi integer ke string
    cc=result.length(); //panjang string
    cout << "Amount : " << cc << " number";

    cout << endl;

    sum=0;
    for(hit=0; hit<cc; hit++)
    {
        jj = result[hit]; //jj, result = string
        kk = convertstrtoint(jj); //konversi jj ke integer
        sum=sum+kk;
    }
    cout << "Total number : " << sum;
}
```

RUN

```
Enter number 0-9 : 123
Amount : 3 number
Total number : 6
```

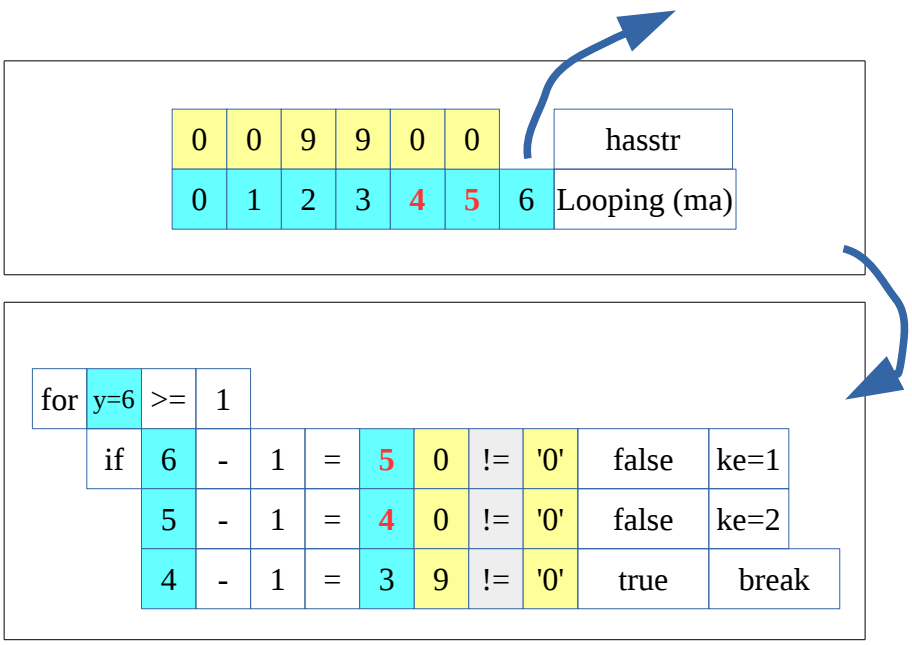
Latihan 25 (hitung jumlah nol dibelakang angka)

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

int main()
{
    string hasstr;
    int ma, ke;
    int y;

    cout << "Enter number : "; cin >> hasstr;
    y = hasstr.length();

    ke=0;
    for(ma=y; ma >=1; ma--) //mis dari 4 ke 1
    {
        if( hasstr[ma-1] != '0') //jk angka sebelum/kiri tidak sama dgn 0
            break; //keluar
        else //jk angka sebelum diketahui nol/0
        {
            ke=ke+1; //tambahkan nol ke variabel ke
        }
    }
        cout << "There is = " << ke << " - 0 behind -";
}
```

RUN

Enter number : 009900
There is = 2 - 0 behind -

y=hasstr.length();
y=6



Latihan 26 (hitung jumlah nol dibelakang angka hasil faktorial)

```
#include <iostream>
#include <sstream> //ostringstream
using namespace std;

long factorial(int fac)
{
    long facto=1;
    while (fac > 1)
    {
        facto=facto*fac;
        fac--;
    }
    return facto;
}

string convertinttostr(int aa)
{
    string bb;

    ostringstream wek; //stream wek used for conversion
    wek << aa; //enter int aa to stream wek
    bb = wek.str(); //string bb to the contents of stream wek
    return(bb); //send back string bb to main function
}

int main()
{
    int fac;
    int aa;
    string hasstr;
    int hasstr_length;
    int ma, ke;

    cout << "Enter number : "; cin >> fac;
    aa = factorial(fac);
    cout << "Factorial : " << aa << endl;

    hasstr = convertinttostr(aa); //conversi ke string supaya bisa dicari panjangnya
    hasstr_length = hasstr.length();
    cout << "length : " << hasstr_length << endl;

    ke=0;
    for(ma=hasstr_length; ma >=1; ma--) //mis dari 4 ke 1
    {
        if(hasstr[ma-1] != '0') //jk angka sebelum/kiri tidak sama dgn 0
            break; //keluar
        else //jk angka sebelum diketahui nol/0
        {
            ke=ke+1; //tambahkan nol ke variabel ke
        }
    }
    cout << "0 behind = " << ke;
}
```

RUN

```
Enter number : 8
Factorial : 40320
length : 5
0 behind = 1
```

4	0	3	2	0	factorial
0	1	2	3	4	loop

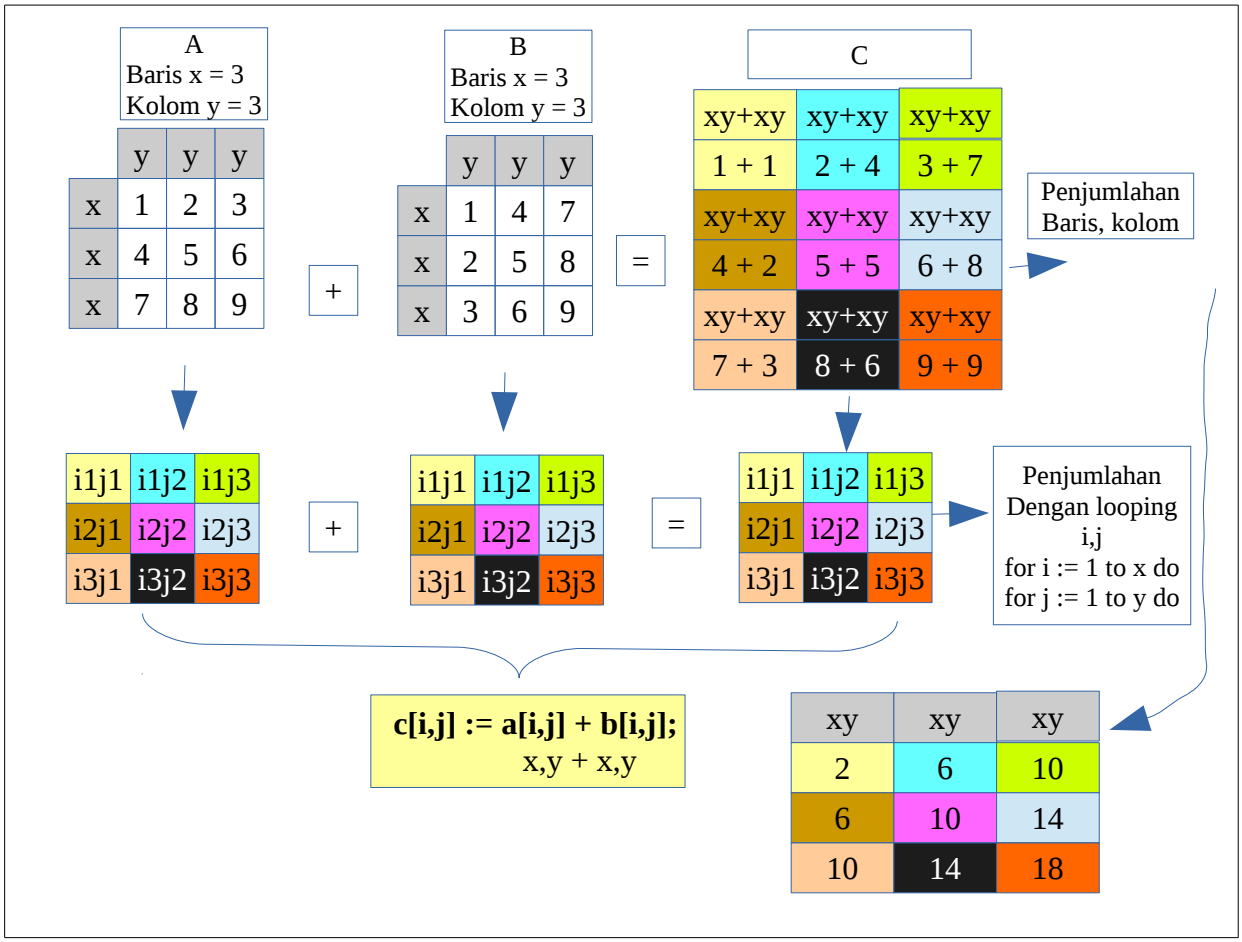
Latihan 27 (Cin & Cout arrays 2d (matrix horizontal & vertikal))

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

int main()
{
    int a[50][50];
    int x,y, aa,bb;

    cout << "Baris/rows : ";cin >> x;
    cout << "Kolom/cols : ";    cin >> y;
    cout << endl;

    cout << "Input matrix\n";
    for(aa=1; aa<=x; aa++)
    {
        for(bb=1; bb<=y; bb++)
        {
            cout << aa << bb << " : ";
            cin >> a[aa][bb];
        }
    }
    cout << endl;
    cout << "Output matrix horizontal\n";
    for(aa=1; aa<=x; aa++)
    {
        for(bb=1; bb<=y; bb++)
            cout << a[aa][bb];
        cout << endl;
    }
    cout << endl;
    cout << "Output matrix vertical\n";
    for(aa=1; aa<=y; aa++)
    {
        for(bb=1; bb<=x; bb++)
            cout << a[bb][aa];
        cout << endl;
    }
}
```

RUN

```
Baris/rows : 2
Kolom/cols : 3

Input matrix
11 : 2
12 : 3
13 : 4
21 : 5
22 : 1
23 : 6

Output matrix horizontal
234
516

Output matrix vertical
25
31
46
```

Latihan 28 (Penambahan matriks)



Penambahan matriks

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

int main()
{
    int a[50][50], b[50][50], c[50][50];
    int i,j,x,y,s;

    cout << "How many Rows & Colums : "; cin >> s;
    x=s; y=s;
    cout << "Input matrix A & B\n";
    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   cout << i << j << " : "; cin >> a[i][j];   }
    }
    cout << endl;
    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   cout << i << j << " : "; cin >> b[i][j];   }
    }
    cout << endl;

    cout << "Matrix A\n";
    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   cout << a[i][j] << " ";    }
        cout << endl;
    }
    cout << endl;
    cout << "Matrix B\n";
    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   cout << b[i][j] << " ";    }
        cout << endl;
    }
    cout << endl;

    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   c[i][j]=a[i][j]+b[i][j];  }
    }

    cout << "Matrix A + matrix B\n";
    for(i=1; i<=x; i++)
    {
        for(j=1; j<=y; j++)
        {   cout << c[i][j] << " ";  }
        cout << endl;
    }
    cout << endl;
}
```

RUN

```
How many Rows & Colums : 3
Input matrix A & B
11 : 1
12 : 2
13 : 3
21 : 4
22 : 5
23 : 6
31 : 7
32 : 8
33 : 9

11 : 1
12 : 4
13 : 7
21 : 2
22 : 5
23 : 8
31 : 3
32 : 6
33 : 9

Matrix A
1 2 3
4 5 6
7 8 9

Matrix B
1 4 7
2 5 8
3 6 9

Matrix A + matrix B
2 6 10
6 10 14
10 14 18
```

Latihan 29 (Hitung jumlah karakter → array char)

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

void countchar(char xx[])
{
   int amount, counting;
   amount = 0;
   counting = 0;

   for (counting = 0; xx[counting]; counting++)
       amount++;

   cout << amount << " character";
}

int main()
{
   char a[101];

   cout << "Enter name : ";    cin.getline(a,sizeof(a));
   cout << "\n";
   countchar(a);
   cout << "\n";
}
```

Function **no return value** using **void**

RUN

Enter name : wokki's lab

11 character

arrays **a[101]** consists of 100 character , 1 character left is null terminator

receive input name with space

call function

getline guarantee that we will not overflow the array when we enter more than 100 character

sizeof(a) = 101 (100 character, 1 null)

Latihan 30 (Mencari rata-rata / average (array sebagai parameter fungsi))

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

If using pointer add *
float getAvg(int *number, int size)

```
float getAvg(int number[], int size) //function getAvg
{
    int aa;
    float sum;
    float avg;

    sum = 0;

    for(aa=0; aa<size; ++aa)
        {
            if (aa==size-1)
                cout << number[aa];
            else
                cout << number[aa] << " + " ;

            sum = sum + number[aa];
        }

    cout << " = " << sum << " / " << size;
    cout << "\n";
    avg = sum / size;

    return avg;
}

int main()
{
    int number[100];
    float average;
    int size;
    int zz;

    cout << "Enter amount of value : "; cin >> size;
    for (zz = 0; zz < size; ++zz)
    {
        cout << "Number " << zz+1 << " : "; cin >> number[zz];
    }
    cout << "\n";
    cout << "Solution\n";
    average = getAvg(number, size);
    cout << "\nAverage : " << average;
}
```

RUN

```
Enter amount of value : 4
Number 1 : 3
Number 2 : 4
Number 3 : 2
Number 4 : 5

Solution
3 + 4 + 2 + 5 = 14 / 4

Average : 3.5
```

Latihan 31 (Mengembalikan nilai dua parameter sekaligus)

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

string add(int x, int y)
{
    string s;
    x = x + 10;
    y = y + 10;
    cout << x  << "\n" << y;
    return s;
}

int main()
{
   int a,b;
   a=10;
   b=10;
   cout << add(a, b);
}
```

Gunakan tipe string pada variabel
yang digunakan untuk mengembalikan nilai

Nama variabel bebas (s) walaupun tidak
digunakan dalam proses perhitungan (x,y)

RUN

```
20
20
```

Latihan 32 (Konversi karakter pertama pada tiap kata ke huruf besar)

```
#include <iostream>
#include <cctype> //touuper
#include <cstring> //strlen
using namespace std;

void convertup(char name[100])
{
    int aa, bb;
    char space=' ';

    aa = strlen(name);
    name[0] = toupper(name[0]);

    for (bb = 0; bb <=aa; bb++)
    {
        if (name[bb] == space )
        {
            cout << " ";
            name[bb+1] = toupper(name[bb+1]);
        }
        else
            cout << name[bb];
    }
}

int main()
{
    char name[100];

    cout << "Enter sentences : "; cin.getline(name, sizeof(name));
    convertup(name);
}
```

strlen = hitung jumlah karakter
toupper = hubah ke huruf besar

RUN

```
Enter sentences : wokki's lab
Wokki's Lab
```

Latihan 33 (Konversi semua karakter ke huruf besar (uppercase))

```
#include <iostream>
#include <cctype> //touuper
#include <cstring> //strlen
using namespace std;

void bigfont(char name[100])
{
    int aa, bb;
    aa = strlen(name);

    for (bb = 0; bb <=aa; bb++)
    {
        name[bb] = toupper(name[bb]);
        cout << name[bb];
    }
}

int main()
{
    char name[100];

    cout << "Enter sentences : "; cin.getline(name, sizeof(name));
    bigfont(name);
}
```

RUN

```
Enter sentences : wokki's lab
WOKKI'S LAB
```

tolower

Latihan 34 (Mencari deret bilangan prima)

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

int main()
{
    int prima,i,j,bil;
    for(i=2; i<=10; i++)
    {
        prima = i;
        for(j=2; j<= i-1; j++)
        {
            bil = i%j;
            if(bil==0) prima=0;
        }
        if(prima!=0) cout << prima << " ";
    }
}
```

Bilangan prima adalah bilangan asli yang lebih besar dari 1.
Bilangan prima bisa dibagi 1.
Bilangan prima bisa dibagi bilangan itu sendiri.
Contoh : 2, 3, 5, 7

```
for i = 2 ; i<=10
{
  prima = i → 2
  for j = 2; j<= i – 1 → 2 ke 2 - 1
        = 2 ke 1 (looping tidak bisa ke bawah)
  { jangan dijalankan langsung saja lanjut dibawah }
 if prima != 0 cetak prima,' ' →  karena bukan 0 cetak prima 2
}
```

```
for i = 3 ; i<=10
{
  prima = i → 3
  for j = 2 ; j<=  i – 1  → 2 ke 3 - 1
        = 2 ke 2 (looping 1x)
  {
    bil = (i % j);  = 3 % 2 →  1
    if bil = 0  prima = 0 → bil = 1
  }
 if prima != 0 cetak prima,' '  → karena bukan 0 cetak prima 3
}
```

```
for i = 4 ; i<=10
{
  prima = i → 4
  for j = 2; j<= i - 1  → 2  ke  4  – 1
       = 2 ke 3  (looping 2x yaitu 2 dan 3)
  {
    bil = (i % j) → 4 % 2 = 0
    if bil = 0 prima = 0 → prima = 0
  }
 if prima != 0  cetak prima,' ' → prima 0 jangan cetak

  prima = 0
 for j= 3 ke 3
  {
    bil = (i % j) → 4 % 3  = 1
    if bil = 0  prima = 0 → bil = 1
  }
 if prima != 0  cetak prima,' ' → prima 0 jangan cetak
}
```

```
for i := 5 ; i<= 10
{
  prima = i → 5
  for j = 2 ; j<= i - 1  → 2 ke  5  – 1
      j = 2 ke 4 (looping 3x yaitu 2, 3 dan 4)
  {
    bil = (i % j) → 5 % 2 = 1
    if bil = 0  prima = 0 → bil = 1
  }
 if prima != 0 cetak prima[i],' ) → cetak prima 5
  prima =  5
  for j = 3 ke 4
  {
    bil = (i % j) → 5 % 3 = 2
    if bil = 0 prima = 0 → bil = 2
  }
 if prima !=  0 cetak prima[i],' ' → cetak prima 5
 prima =  5
  for j = 4 ke 4
  {
    bil = (i % j) → 5 % 4 = 1
    if bil = 0  prima = 0 → bil = 1
  }
 if prima != 0 cetak prima[i],' ' → cetak prima 5
}
```

Latihan 35 (Menghitung banyak kata dalam kalimat)

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

int main()
{
    string kal;
    int ii, ss, kata, c;
    char space;

    cout << "Masukkan kalimat : ";
    getline(cin,kal);

    ss=kal.length();
    space=' ';
    c=0;
    kata=0;

    for(ii=1; ii <ss; ii++)
    {
        if(kal[ii] != space)
            c=c+1;
        else
        {
            if(c>=1)
            {
                kata=kata+1;
                c=0;
            }
            else
            c=0;
        }
    }

    if(c>0)
        cout << "Ada : " << kata+1 << " kata";
    else
        cout << "Ada : " << kata << " kata";
}
```

```
Masukkan kalimat : sepeda tua
Ada : 2 kata
```

s	e	p	e	d	a		t	u	a	
1	2	3	4	5	6	7	8	9	10	kal[ii]

c untuk tampung sementara karakter
kata untuk simpan permanen karakter menjadi kata

mulai ii = 1 sampai 10 kerjakan

Jika kal[ii] bukan spasi maka tambahkan isi c dengan 1

Jika kal[ii] ternyata spasi maka
Cek jika c >=1 maka tambahkan kata dengan 1
Lalu bersihkan isi c (jadikan 0)
Tapi jika isi c = 0 → tidak ada maka isi c tetap 0

Sebelum mencetak cek dulu

Jika c > 0 → terisi karakter minimal 1, tambah isi kata dengan 1

Jika c = 0 → tidak ada karakter di c maka langsung cetak kata

Latihan 36 (Menghitung banyak kata dalam beberapa kalimat)

```
#include <iostream>
using namespace std;
int main()
{
    int jkal, rool, ii, ss, kata, c ;
    string kal[200];
    char space;

    cout << "Masukkan banyak kalimat : "; cin >> jkal;
    cout << "\n";
    cin.ignore(); // jk tidak ada maka getline langsung rool 2

    for(rool=1; rool<=jkal; rool++)
    {
        cout << "Masukkan kalimat " << rool << " : ";
        cin.ignore(); // jk tidak ada maka getline langsung rool 2
        getline(cin, kal[rool]);
    }
    cout << "\n";

    for(rool=1; rool<=jkal; rool++)
    {
        ss=kal[rool].length();
        cout << "Kalimat " << rool << " ada : " << ss << " karakter termasuk spasi\n";

        space=' ';
        c=0;
        kata=0;

        for(ii=1; ii<ss; ii++)
        {
            if(kal[rool][ii] != space)
                c=c+1;
            else
            {
                if(c>=1)
                {
                    kata=kata+1;
                    c=0;
                }
                else
                    c=0;
            }
        }
        if(c>0)    cout << "Ada : " << kata+1 << " kata\n";
        else    cout << "Ada : " << kata << " kata\n";
        cout << "\n";
        cout << "Kata pertama minimal dua karakter atau jika hanya satu karakter maka awali dengan spasi";
    }
}
```

Cin >> meninggalkan \n pada iostream,
jk getline digunakan setelah cin
maka getline melihat karakter \n ini sebagai spasi
didepan sehingga tidak membaca karakter awal

Latihan 37 (Mengurutkan angka dari kecil ke besar)

```
Masukkan jumlah angka : 4
Angka 1 : 23
Angka 2 : 45
Angka 3 : 11
Angka 4 : 24

Angka yang dimasukkan: 23 45 11 24
Angka diurutkan: 11 23 24 45
```

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

int main()
{
    int jlh;
    int aa[100];
    int ff,gg, temp;

    cout << "Masukkan jumlah angka : "; cin >> jlh;
    for(ff=1; ff<=jlh; ff++)
    {
        cout << "Angka " << ff << " : "; cin >> aa[ff];
    }

    cout << "\nAngka yang dimasukkan: ";
    for(ff=1; ff<=jlh; ff++)
        cout << aa[ff] << " ";

    cout << "\nAngka diurutkan: ";
    for(ff=1; ff<=jlh; ff++)
        for(gg=1; gg<=jlh-1; gg++)
        {
            if(aa[gg]>aa[gg+1])
            {
                temp = aa[gg];
                aa[gg]=aa[gg+1];
                aa[gg+1]=temp;
            }
        }

    for(ff=1; ff<=jlh; ff++)
        cout << aa[ff] << " ";
}
```

Posisi awal

1	2	3	4	Looping i / j
23	45	11	24	number[i] number[j]

jlh = 4

for i := 1 to 4 do
  for j := 1 to jlh – 1 do
    = 1 to 4 – 1 do
    = 1 to 3 do
    if (**number**[**j**] > **number**[**j**+1]) then

1		2	
23	>	45	**tidak**

    begin
      jangan jalankan proses disini
    end;

  for j := 2 to 3 do
    if (**number**[**j**] > **number**[**j**+1]) then

2		3	
45	>	11	**ya**

    begin
      temporary := **number**[**j**]; = 45
    number[**j**] := **number**[**j**+1]; = 11
    number[**j**+1] := **temporary**; = 45
    end;

  for j := 3 to 3 do
    if (**number**[**j**] > **number**[**j**+1]) then

3		4	
45	>	24	**ya**

    begin
      temporary := **number**[**j**]; = 45
    number[**j**] := **number**[**j**+1]; = 24
    number[**j**+1] := **temporary**; = 45
    end;

Posisi setelah for j := 2 to 3

1	2	3	4	Looping i / j
23	11	45	24	number[i] number[j]

jlh = 4

Posisi setelah for j := 3 to 3

1	2	3	4	Looping i / j
23	11	24	45	number[i] number[j]

jlh = 4

Posisi sekarang setelah for i := 1 to 4

1	2	3	4	Looping i / j
23	11	24	45	number[i] number[j]

jlh = 4

```
for i := 2 to 4 do
  for j := 1 to jlh – 1 do
        = 1 to 4 – 1 do
        = 1 to 3 do
      if (number[j] > number[j+1]) then
```

1 (23) > 2 (11) — ya

```
        begin
          temporary := number[j]; = 23
      number[j] := number[j+1]; = 11
      number[j+1] := temporary; = 23
        end;

  for j :=  2 to 3 do
      if (number[j] > number[j+1]) then
```

2 (23) > 3 (24) — tidak

```
      begin
          jangan jalankan proses disini
      end;

for j :=  3 to 3 do
      if (number[j] > number[j+1]) then
```

3 (24) > 4 (45) — tidak

```
    begin
        jangan jalankan proses disini
      end;
```

Posisi setelah for j := 1 to 3

1	2	3	4	Looping i / j
11	23	24	45	number[i] number[j]

jlh = 4

Posisi sekarang setelah for i := 2 to 4

1	2	3	4	Looping i / j
11	23	24	45	number[i] number[j]

jlh = 4

```
for i := 3 to 4 do
  for j := 1 to jlh – 1 do
        = 1 to 4 – 1 do
        = 1 to 3 do
      if (number[j] > number[j+1]) then
```

1 (11) > 2 (23) — tidak

```
        begin
          jangan jalankan proses disini
        end;

  for j :=  2 to 3 do
      if (number[j] > number[j+1]) then
```

2 (23) > 3 (24) — tidak

```
      begin
          jangan jalankan proses disini
      end;

for j :=  3 to 3 do
      if (number[j] > number[j+1]) then
```

3 (24) > 4 (45) — tidak

```
    begin
        jangan jalankan proses disini
      end;
```

for i := 4 to 4 do
sama dengan for i : = 3 to 4

```
for i := 1 to jlh do
        i to 4
    write(number[i], ' ');
```

1	2	3	4	Looping i / j
11	23	24	45	number[i] number[j]

Latihan 38 (Konversi bilangan desimal ke biner)

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

void bilbiner(int des)
{
    int hb, sb;
    string biner, cb;
    int pcb, ss;

    cb=' ';
    while(des>=1)
    {
        hb=des/2;
        sb=des%2;
        des=hb;

        if(sb==0) biner = '0'; else biner = '1';
            cb=cb+biner;
    }
    //putar belakang ke depan
    pcb=cb.length();
    for(ss=pcb; ss>=1; ss--)
        cout << cb[ss];
}

int main()
{
    int des;
    cout << "Desimal : "; cin >> des;
    bilbiner(des);
}
```

```
RUN

Desimal : 10
1010
```

```
cb=' '
while(10>=1)
{
    hb=10/2=5;  sb=10%2=0; des=5;
    if(sb==0) biner='0';   cb=0;
}
while(5>=1)
{
    hb=5/2=2; sb=5%2=1; des=2;
    if(sb==1) biner='1'; cb=01;
}
while(2>=1)
{
    hb=2/2=1; sb=2%2=0; des=1;
    if(sb==0) biner='0'; cb=010;
}
while(1>=1)
{
    hb=1/2=0; sb=1%2=1; des=0
    if(sb==1) biner='1'; cb=0101;
```

```
//putar
pcb=4;
for(ss=4; ss>=1; ss--)
    cout cb[ss];
```

cb	0	1	0	1
ss	1	2	3	4
	finish			start

Latihan 39 (Jika karakter sama semua pada baris array maka cetak bintang)

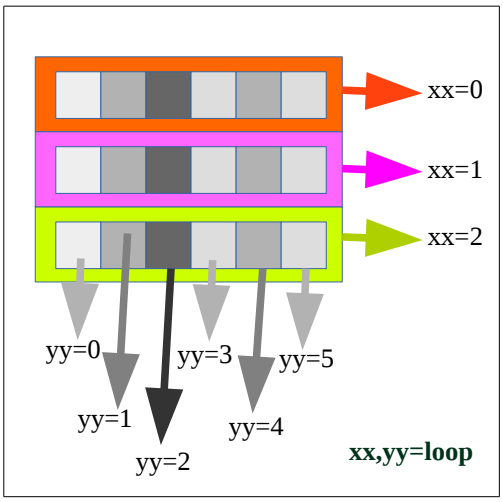
```
#include <iostream>
using namespace std;

int main()
{
    int baris, kolom;
    int num[100][100];
    int xx, yy;
    short w;

    cout << "Baris, kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        for(yy=0; yy<kolom; yy++)
        {   cin >> num[xx][yy];}
    }
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        w=0;

        for(yy=0; yy<kolom; yy++)
        {
            if((num[xx][yy]==1))
                w+=1;
        }

        for(yy=0; yy<kolom; yy++)
        {
            if(w==kolom)
                cout << "*" << " ";
            else
                cout << num[xx][yy] << " " ;
        }

        cout << endl;
    }
}
```

```
Baris, kolom : 3 6

0 1 0 1 0 0
1 1 1 1 1 1
0 0 1 1 0 0

0 1 0 1 0 0
* * * * * *
0 0 1 1 0 0
```

Input array

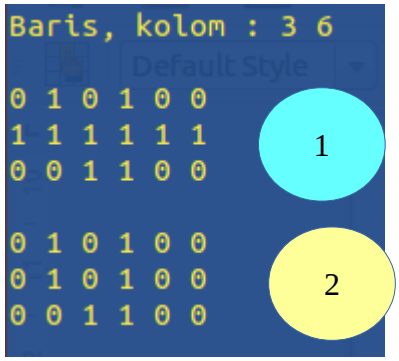
Jika ketemu 1 tambah w dengan 1

Jika w= 6 cetak *



Latihan 40 (Jika karakter sama semua pada baris array, cetak karakter looping sebelumnya)

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

int main()
{
    int baris, kolom;
    int num[100][100];
    int xx, yy;
    short w;

    cout << "Baris, kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        for(yy=0; yy<kolom; yy++)
        {   cin >> num[xx][yy];}
    }
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        w=0;

        for(yy=0; yy<kolom; yy++)
        {
            if((num[xx][yy]==1))
                w+=1;
        }

        for(yy=0; yy<kolom; yy++) //yy=0; yy<6
        {
            if(w==kolom) //pada baris ini jika w=6
                cout << num[xx-1][yy] << " "; //cetak sama dgn angka baris seblumnya
            else
                cout << num[xx][yy] << " " ;
        }

        cout << endl;
    }
}
```

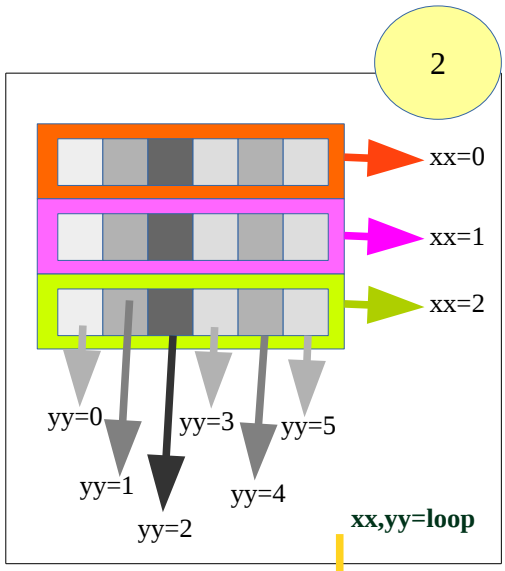


1

Input array

2

Jika ketemu 1 tambah w dengan 1

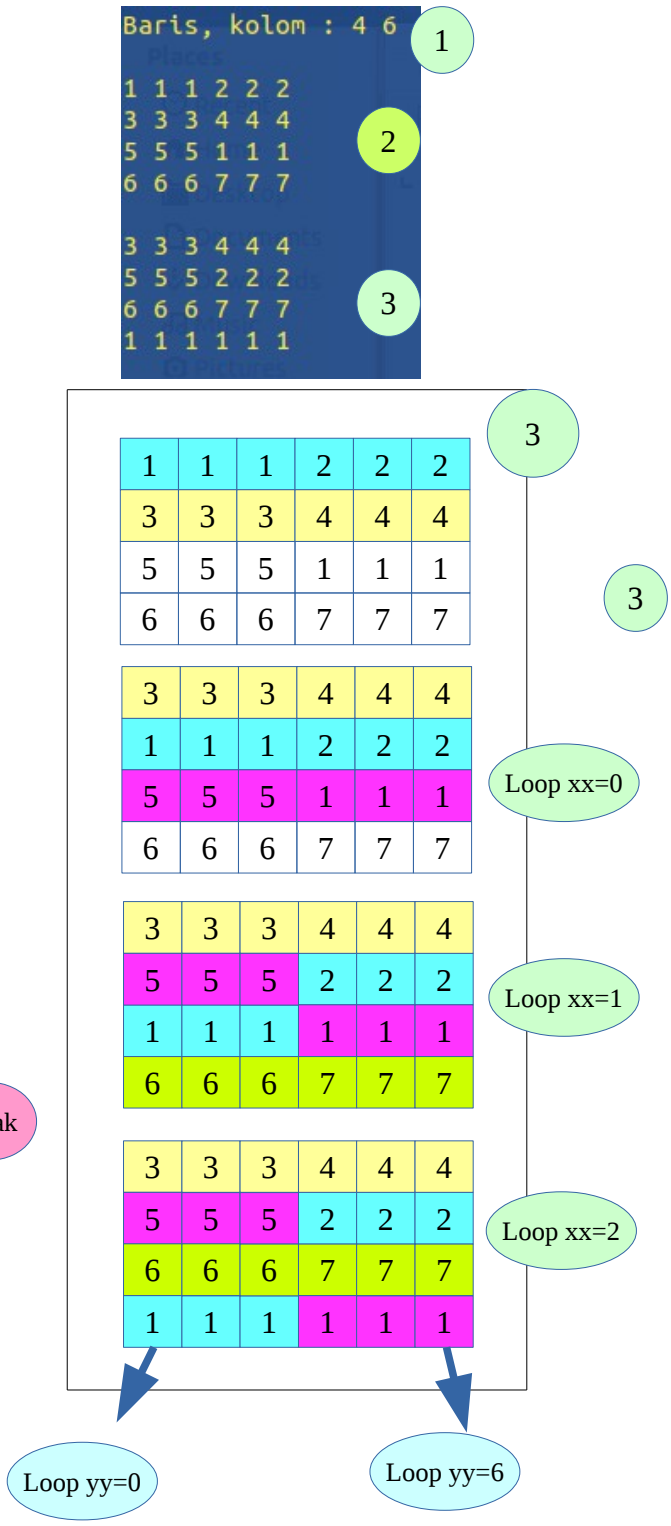


2

```
for(xx=0; xx<3)
    for(yy=0 yy<6) → w=2
    for(yy=0 yy<6) → 0 1 0 1 0 0
for(xx=1; xx<3)
    for(yy=0 yy<6) → w=6 (w=kolom)
    for(yy=0 yy<6) → 0 1 0 1 0 0 (num[xx-1][yy]
for(xx=2; xx<3)
    for(yy=0 yy<6) → w=2
    for(yy=0 yy<6) → 0 0 1 1 0 0
```

Latihan 41 (Putar angka vertikal (jika angka dibawah lebih besar, hanya satu putaran))

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

void swap(int &x, int &y)
{
    int temp;
    temp = x;  //temp=num[xx][yy];
    x=y;  //num[xx][yy]=num[xx+1][yy];
    y=temp;  //num[xx+1][yy]=temp;
}

int main()
{
    int baris, kolom;
    int num[100][100];
    int xx, yy;

    cout << "Baris, kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        for(yy=0; yy<kolom; yy++)
        {    cin >> num[xx][yy]; }
    }
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {

        for(yy=0; yy<kolom; yy++)
        {
            if(num[xx][yy]<num[xx+1][yy])
            {    swap(num[xx][yy],num[xx+1][yy]);    }
        }

        for(yy=0; yy<kolom; yy++)
        {        cout << num[xx][yy] << " " ;    }
        cout << endl;
    }
}
```



Latihan 42 (Putar angka vertikal (putar terus sampai angka paling besar berada di atas))

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

void swap(int &x, int &y)
{
    int temp;
    temp = x;  //temp=num[xx][yy];
    x=y;  //num[xx][yy]=num[xx+1][yy];
    y=temp;  //num[xx+1][yy]=temp;
}

int main()
{
    int baris, kolom;
    int num[100][100];
    int xx, yy;
    int mm;

    cout << "Baris, kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    // ---------- input
    for(xx=0; xx<baris; xx++)
    {
        for(yy=0; yy<kolom; yy++)
        {    cin >> num[xx][yy];     }
    }
    cout << endl;

    //---------- proses
    for(mm=0; mm<baris; mm++) // looping kembali 4x setelah looping dibawah (nama var mm bebas)
    {
        for(xx=0; xx<baris-1; xx++) // looping 4x baris
        {
            for(yy=0; yy<kolom; yy++) // setiap 1x baris ulang 6x kolom
            {
                if(num[xx][yy]<num[xx+1][yy]) // jika angka pada baris [xx][yy] sekarang < angka dibawah
                {    swap(num[xx][yy],num[xx+1][yy]); } //putar angka nya
            }
        }
    }

    //------------cetak
        for(xx=0; xx<baris; xx++)
        {
            for(yy=0; yy<kolom; yy++)
            {    cout << num[xx][yy] << " " ;  }
            cout << endl;
        }
}
```

```
Baris, kolom : 4 6

1 1 1 2 2 2
3 3 3 4 4 4
5 5 5 1 1 1
6 6 6 7 7 7

6 6 6 7 7 7
5 5 5 4 4 4
3 3 3 2 2 2
1 1 1 1 1 1
```

1

2 & 3

Input array 2 dimensi

1

2

if(num[xx][yy]>num[xx+1][yy])

1
3

putar

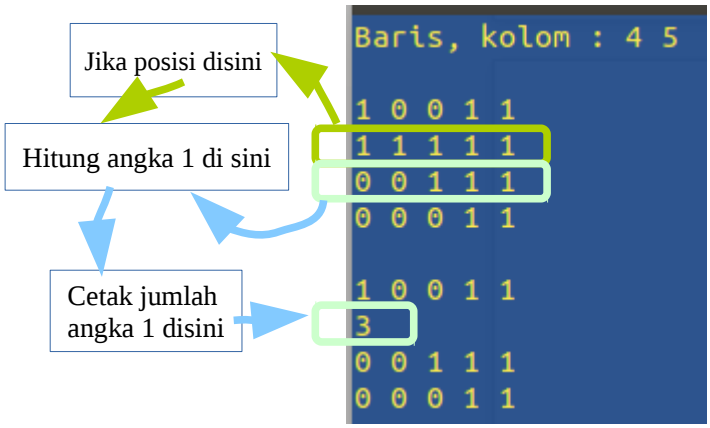
3
1

3

Setelah semua looping selesai diatas baru cetak data

Latihan 43 (Jika berada pada baris dengan jumlah angka 1 = jumlah kolom, hitung angka 1 pada baris berikut)

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

int main()
{
    int baris, kolom;
    int num[100][100];
    int xx, yy;
    short w;

    cout << "Baris, kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        for(yy=0; yy<kolom; yy++)
        {    cin >> num[xx][yy];}
    }
    cout << endl;

    for(xx=0; xx<baris; xx++)
    {
        w=0;
        for(yy=0; yy<kolom; yy++)
        {
            if((num[xx][yy]==1))
                w+=1;
        }

        for(yy=0; yy<kolom; yy++)
        {
            if(w==kolom) //jk angka 1 sbyk jlh kolom
            {
                int s=0; //hitung angka 1 pada looping xx berikut
                for(yy=0; yy<kolom; yy++)
                {
                    if((num[xx+1][yy]==1))
                    s+=1;
                }
                cout << s; //cetak jlh angka 1 tersebut
            }
            else
                cout << num[xx][yy] << " " ;
        }
        cout << endl;
    }
}
```



Input data

Selama xx = baris

Hitung banyak angka 1 simpan dalam w

Pada xx baris selama yy = kolom

Jika posisi berada pada w = kolom

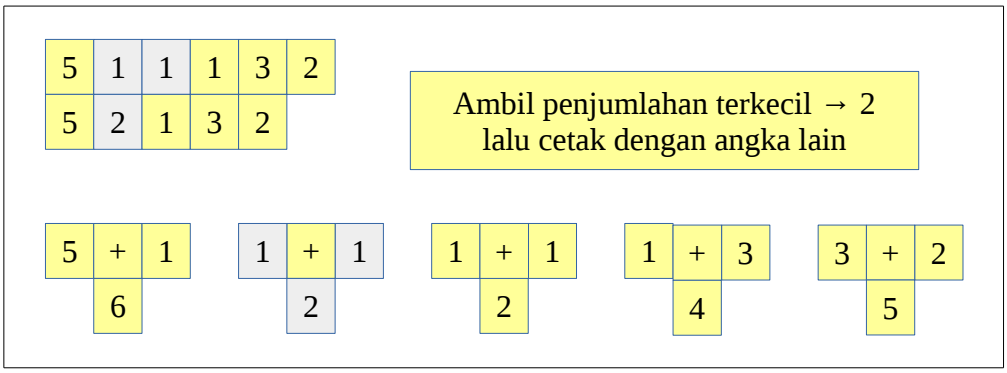
Hitung jumlah angka 1 pada baris (xx) berikutnya lalu cetak jumlahnya

Jika posisi tidak berada pada w = kolom cetak inputan lalu spasi

Latihan 44 (Penjumlahan kemudian ambil hasil terkecil untuk dicetak)

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

int main()
{
    int jlh;
    int aa[100];
    int ff,gg,ll;
    int kkk;

    cout << "Masukkan jumlah angka : "; cin >> jlh; //jlh=6

    for(ff=1; ff<=jlh; ff++) //loop 1-6
    {   cout << "Angka " << ff << " : "; cin >> aa[ff];   }

    kkk=1000;
    for(gg=1; gg<=jlh-1; gg++) //loop 1-5 = 12,23,34,45,56
    {
        ll=aa[gg]+aa[gg+1];
        if(ll<kkk)
        {   kkk=ll;  }
    }

    for(gg=1; gg<=jlh; gg++) //loop 1-6
    {
        if(aa[gg]+aa[gg+1]==kkk)
        {
            cout << kkk;
            kkk = 0;
            gg++;
        }
        else
        cout << aa[gg];
    }
}
```

```
Masukkan jumlah angka : 6
Angka 1 : 5
Angka 2 : 1
Angka 3 : 1
Angka 4 : 1
Angka 5 : 3
Angka 6 : 2
52132
```



Latihan 45 (ganjil genap)

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

void ganjilgenap(int a, int b)
{
    int ha,hb;
    ha = a%2;
    hb = b%2;

    if(ha==0) //tidak bersisa
        cout << "genap" << ",";
    else
        cout << "ganjil" << ",";

    if(hb==0) //tidak bersisa
        cout << "genap" << " ";
    else
        cout << "ganjil" << " ";
}

int main()
{
    int baris, kolom;
    int a,b;

    cout << "Masukkan baris dan kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(a=0; a<baris; a++)
    {
        for(b=0; b<kolom; b++)
        {   cout << a << b << " ";   }
        cout << endl;
    }

    for(a=0; a<baris; a++)
    {
        for(b=0; b<kolom; b++)
        {       ganjilgenap(a,b);     }
        cout << endl;
    }
}
```

```
Masukkan baris dan kolom : 2 3
00 01 02
10 11 12
genap,genap genap,ganjil genap,genap
ganjil,genap ganjil,ganjil ganjil,genap
```

Latihan 46 (genap genap, genap ganjil, ganjil ganjil dan ganjil genap)

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

void ganjilgenap(int a, int b)
{
    int ha,hb;
    ha = a%2;
    hb = b%2;

    if((ha==0)&&(hb==0) )
        cout << "*" << " ";
    else if ((ha==0)&&(hb==1))
        cout << "$" << " ";
    else if((ha==1)&&(hb==1))
        cout << "#" << " ";
    else
        cout << "$" << " ";
}

int main()
{
    int baris, kolom;
    int a,b;

    cout << "Masukkan baris dan kolom : ";
    cin >> baris;
    cin >> kolom;
    cout << endl;

    for(a=0; a<baris; a++)
    {
        for(b=0; b<kolom; b++)
        {
            ganjilgenap(a,b);
        }
        cout << endl;
    }
}
```

```
Masukkan baris dan kolom : 4 5

* $ * $ *
$ # $ # $
* $ * $ *
$ # $ # $
```

	a%2	b%2				
00	0%2	0%2	=	0	0	*
01	0%2	1%2	=	0	1	$
02	0%2	2%2	=	0	0	*
03	0%2	3%2	=	0	1	$
04	0%2	4%2	=	0	0	*
10	1%2	0%2	=	1	0	$
11	1%2	1%2	=	1	1	#
12	1%2	2%2	=	1	0	$
13	1%2	3%2	=	1	1	#
14	1%2	4%2	=	1	0	$

dst

00	01	02	03	04
10	11	12	13	14
20	21	22	23	24
30	31	32	33	34

4 baris

5 kolom

Latihan 47 (Putar string dari belakang ke depan (fungsi dengan parameter nilai/value))

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

string turnstring(string a)
{
    int b,x;
    string y;
    b=a.length();

    for(x=b; x>=0; x--)
        cout << a[x];

    return y;
}

int main()
{
    string a;

    cout << "Enter sentences : "; getline(cin,a);
    cout << turnstring(a);
}
```

Parameter value (string a)

Karena tipe string
boleh gunakan nama variabel bebas

RUN

```
Enter sentences : sepeda tua
aut adepes
```

Latihan 48 (Putar string dari belakang ke depan (fungsi dengan parameter reference))

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

void turnstring(string &a)
{
    int b,x;
    b=a.length();

    for(x=b; x>=0; x--)
        cout << a[x];
}

int main()
{
    string a;

    cout << "Enter sentences : "; getline(cin,a);
    turnstring(a);
}
```

Parameter reference (string &a)

Fungsi void tidak mengembalikan nilai ke fungsi utama/main sehingga parameter reference dimanfaatkan fungsi utama untuk mengambil hasil cetak/cout a[x] pada fungsi void

Jika parameter reference (&) dihapus menjadi (string a) saja maka hasil a[x] akan dicetak/cout langsung pada fungsi void

Latihan 49 (Deteksi umur (osn 2010 no.39))

Matematikawan August DeMorgan hidup pada tahun 1800-an. Pada tahun terakhir dalam masa hidupnya dia menyatakan bahwa : “Dulu aku berusia x tahun pada tahun x2 ”. Pada tahun berapakah ia dilahirkan...

Penyelesaian:

Bilangan kuadrat di range 1800an hanyalah 1849, yaitu 43^2.
Maka ia lahir pada 1849-43=1806

Kode:

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

int main()
{
    int a,b,c,s,t,w,v;

    a=1800;
    b=a+99;
    cout << "Awal tahun : " << a << endl;
    cout << "Akhir tahun : " << b; //tambah 99
    cout << endl;
    c=b-a;
    w=0;
    v=0;
    for(t=0; t<c; t++) //0-98 = 99
    {
        s=t*t; //pangkatkan 2 dari loop 0-98

        if((s>=a)&&(s<=b)) //jk hasil pangkat ketemu angka antara 1800 - 1899
        {
            cout << t << " = " << s << " ini tahunnya" << endl; //cetak looping dan kuadratnya
            w=t; //simpan looping ke variabel w (43)
            v=s; //simpan kuadratnya ke variabel v (1849)
        }
    }
    cout << endl;
    cout << "Tahun dilahirkan : " << v-w; //kurangi hasil kuadrat 1849– dengan akar kuadratnya 43
}
```

RUN

```
Awal tahun : 1800
Akhir tahun : 1899
43 = 1849 ini tahunnya

Tahun dilahirkan : 1806
```

Latihan 50 (quicksort)

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

void printquicksort(int *a, int hmm)
{
    int ss=0;
    while(ss<hmm)
    {
        cout << a[ss] << " ";
        ss++;
    }
}

void swap(int i, int j, int *a)
{
    int t;
    t = a[i];
    a[i] = a[j];
    a[j] = t;
}

void quicksort(int *aa, int ll, int rr) //((10,4,2,6,1,2,6,9,0 ), 0, 8)
{
    int mm = ll+(rr-ll)/2; // mm=0+(8-0)/2 = 4
    int pv=aa[mm]; // pv=1[4]
    int i=ll; // i=0
    int j=rr; // j=8

    while(ll<rr) // 0 < 8 || 0 < 8
    {
        while(aa[i]<pv) // 10[0] < 4, dst
        i++; //
        while(aa[j]>pv) // 0[8] > 4, dst
        j--; //

        if(i<=j)
        {
            swap(i,j,aa);
            i++;
            j--;
        }
        else
        {
            if(ll<j)
                quicksort(aa,ll,j);
            if(i<rr)
                quicksort(aa,i,rr);
            return;
        }
    }
}

int main()
{
    int aa[] = { 10,4,2,6,1,2,6,9,0 };
    int jaa;

    jaa = sizeof(aa)/sizeof(aa[0]); //length of array 9
    quicksort(aa,0,jaa-1); //process ((10,4,2,6,1,2,6,9,0 ), 0, 8)
    printquicksort(aa,jaa); //output
}
```

RUN

0 1 2 2 4 6 6 9 10

ll=0; rr=8; i=0; j=8; mm=4; pv=1[4]

10	4	2	6	1	2	6	9	0	*aa
0	1	2	3	4	5	6	7	8	
ll,i				pv				rr,j	

while(ll<rr) → 0<8
while(aa[i]<pv) → 10[0]<1[4] false
while(aa[j]>pv) → 0[8]>1[4] false
if(i<=j) → 0<=8 true
swap(i,j,aa) → 0,4,2,6,1,2,6,9,10
i++ → 1; j-- → 7

0	4	2	6	1	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
	ll,i			pv			rr,j		

while(aa[i]<pv) → 4[1]<1[4] false
while(aa[j]>pv) → 9[7]>1[4] true; j--
6[6]>1[4] true; j--
2[5]>1[4] true; j--
1[4]>1[4] false
if(i<=j) → 1<=4 true
swap(i,j,aa) → 0,1,2,6,4,2,6,9,10
i++ → 2; j-- → 3

0	1	2	6	4	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
		ll,i	rr,j						

while(aa[i]<pv) → 2[2]<1[4] false
while(aa[j]>pv) → 6[3]>1[4] true; j--
2[2]>1[4] true; j--
1[1]>1[4] false
if(i<=j) → 2<=1 false
if(ll<j) →0 < 1 true; **quicksort**(aa,ll,j) → [0,1,2,6,4,2,6,9,10], 0, 1
if(i<rr) → 2 < 8 true; **quicksort**(aa,i,rr); → [0,1,2,6,4,2,6,9,10], 2, 8

quicksort(aa,ll,j) → [0,1,2,6,4,2,6,9,10], 0, 1
ll=0; rr=1; i=0; j=1; mm=0; pv=0[0]

0	1	2	6	4	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
ll,i	rr,j								
pv									

while(ll<rr) → 0<1
while(aa[i]<pv) → 0[0]<0[0] false
while(aa[j]>pv) → 1[1]>0[0] true; j--
→ 0[0]>0[0] false
if(i<=j) → 0<=0 true
swap(i,j,aa) → 0,1,2,6,4,2,6,9,10
i++ → 1; j-- → **tidak bisa lagi**

0	1	2	6	4	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
rr,j	ll,i								

Stop decrement
Karena sudah berada di 0

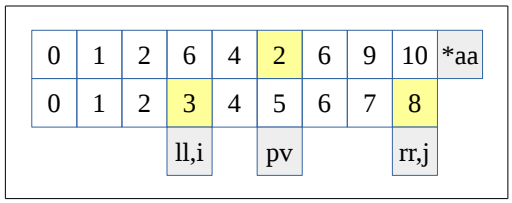
quicksort(aa,i,rr); → [0,1,2,6,4,2,6,9,10], 2, 8
ll=2; rr=8; i=2; j=8; mm=5; pv=2[5]

0	1	2	6	4	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
		ll,i			pv			rr,j	

while(ll<rr) → 2<8
while(aa[i]<pv) → 2[2]<2[5] false
while(aa[j]>pv) → 10[8]>2[5] true; j--
→ 9[7]>2[5] true; j--
→ 6[6]>2[5] true; j--
→ 2[5]>2[5] false
if(i<=j) → 2<=5 true
swap(i,j,aa) → 0,1,2,6,4,2,6,9,10
i++ → 3; j-- → 4

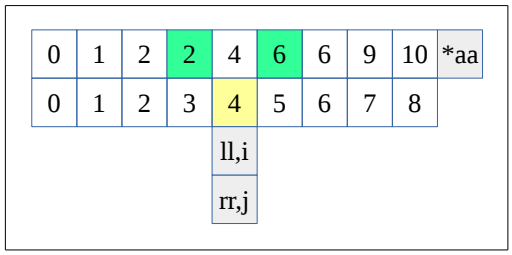
0	1	2	6	4	2	6	9	10	*aa
0	1	2	3	4	5	6	7	8	
			ll,i	rr,j					

while(aa[i]<pv) → 6[3]<2[5] false
while(aa[j]>pv) → 4[4]>2[5] true; j--
→ 6[3]>2[5] true; j--
→ 2[2]>2[5] false
if(i<=j) → 3<=2 false
if(ll<j) →2 < 2 false
if(i<rr) → 3 < 8 true; **quicksort**(aa,i,rr); → [0,1,2,6,4,2,6,9,10], 3, 8

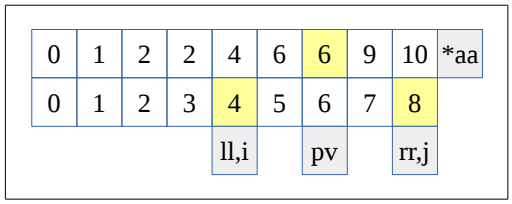


quicksort(aa,i,rr); → [0,1,2,6,4,2,6,9,10], 3, 8
ll=3; rr=8; i=3; j=8; mm=5; pv=2[5]

while(aa[i]<pv) → 6[3]<2[5] false
while(aa[j]>pv) → 10[8]>2[5] true; j--
→ 9[7]>2[5] true; j--
→ 6[6]>2[5] true; j--
→ 2[5]>2[5] false
if(i<=j) → 3<=5 true
swap(i,j,aa) →0,1,2,2,4,6,6,9,10
i++ → 4; j-- → 4



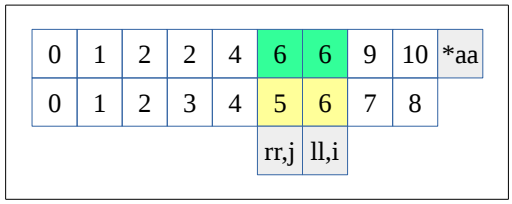
while(aa[i]<pv) → 4[4]<2[5] false
while(aa[j]>pv) → 4[4]>2[5] true; j--
→ 2[3]>2[5] false
if(i<=j) → 4<=3 false
if(ll<j) →3 < 3 false
if(i<rr) → 4 < 8 true; **quicksort**(aa,i,rr); → [0,1,2,2,4,6,6,9,10], 4, 8



quicksort(aa,i,rr); → [0,1,2,2,4,6,6,9,10], 4, 8
ll=4; rr=8; i=4; j=8; mm=6; pv=6[6]

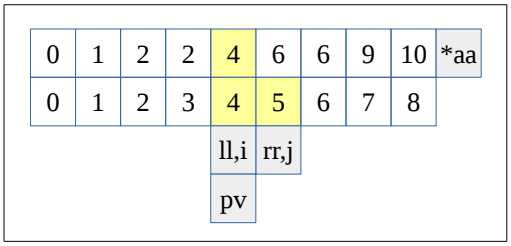
while(aa[i]<pv) → 4[4]<6[6] true
→ 6[5]<6[6] false
while(aa[j]>pv) → 10[8]>6[6] true; j--
→ 9[7]>6[6] true; j--
→ 6[6]>6[6] false

if(i<=j) → 5<=6 true
swap(i,j,aa) →0,1,2,2,4,6,6,9,10
i++ → 6; j-- → 5

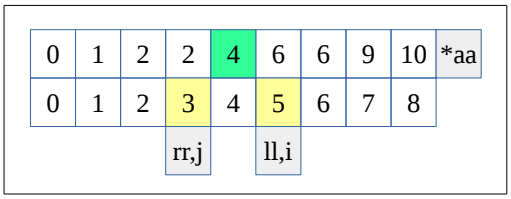


while(aa[i]<pv) → 6[6]<6[6] false
while(aa[j]>pv) → 6[5]>6[6] false
if(i<=j) → 6<=5 false
if(ll<j) →4 < 5 true; **quicksort**(aa,ll,j) → [0,1,2,2,4,6,6,9,10], 4, 5
if(i<rr) → 6 < 8 true; **quicksort**(aa,i,rr); →[0,1,2,2,4,6,6,9,10], 6, 8

quicksort(aa,ll,j) → [0,1,2,2,4,6,6,9,10], 4, 5
ll=4; rr=5; i=4; j=5; mm=4; pv=4[4]



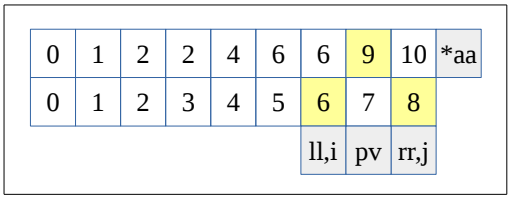
while(aa[i]<pv) → 4[4]<4[4] false
while(aa[j]>pv) → 6[5]>4[4] true
→ 4[4]>4[4] false
if(i<=j) → 4<=4 true
swap(i,j,aa) → 0,1,2,2,4,6,6,9,10
i++ → 5; j-- → 3



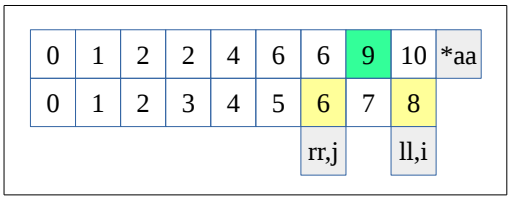
while(aa[i]<pv) → 6[5]<4[4] false
while(aa[j]>pv) → 2[3]>4[4] false
if(i<=j) → 5<=3 false
if(ll<j) → 4 < 3 false
if(i<rr) → 5 < 5 false

Karena semua false
Stop proses

quicksort(aa,i,rr); → [0,1,2,2,4,6,6,9,10], 6, 8
ll=6; rr=8; i=6; j=8; mm=7; pv=9[7]



while(aa[i]<pv) → 6[6]<9[7] true
→ 9[7]<9[7] false
while(aa[j]>pv) → 10[8]>9[7] true
→ 9[7]>9[7] false
if(i<=j) → 7<=7 true
swap(i,j,aa) → 0,1,2,2,4,6,6,9,10
i++ → 8; j-- → 6



while(aa[i]<pv) → 10[8]<9[7] false
while(aa[j]>pv) → 6[6]>9[7] false
if(i<=j) → 8<=6 false
if(ll<j) → 6 < 6 false
if(i<rr) → 8 < 8 false

Karena semua false
Stop proses

Latihan 51 (Membalik angka, abaikan nol didepan, menjumlahkan lalu membalik hasilnya)

```
#include <iostream>
#include <sstream> // ostringstream,  istringstream
using namespace std;

string convertinttostr(int aa)
{
    string bb;
    ostringstream wek;
    wek << aa;
    bb = wek.str();
    return(bb);
}

int convertstrtoint(string aa)
{
    int bb;
    istringstream wek(aa);
    if(!(wek >> bb))
        bb = 0;
    return(bb);
}

string turnstring(string tt)
{
    int mes,y;
    string kir,kor;
    mes = tt.length();

    for(y=mes-1; y>=0; y--)
    {
        kir =tt[y];
        kor = kor+kir;
    }
    return kor;
}

int main()
{
    string a, b, abu, uba;
    int babu;
    string babustr;

    cin >> a;
    cin >> b;

    abu = checknol(a);
    uba = checknol(b);

    //addition
    babu = convertstrtoint(abu) + convertstrtoint(uba);

    //convert & turn string
    babustr = convertinttostr(babu);
    cout << turnstring(babustr);
}
```

1

2

3

```
string checknol(string yy)
{
    int ax,op,w;
    string me,su;
    op = yy.length();

    w=0;
    su='0';
    for(ax=op-1; ax>=0; ax--)
    {
        if(yy[ax]=='0')
        {
            if(w>0)
            {
                me = yy[ax];
                cout << me;
                su = su+me;
            }
        }
        else
        {
            w=w+1;
            me = yy[ax];
            cout << me;
            su = su+me;
        }
    }

    cout << endl;
    return su;
}
```

4

5

Run

01010 0653000
1010
3560
0754

input

Putar angka abaikan nol didepan

Jumlahkan angka lalu putar lagi

putar
01010
0003560

01010

4

0 w=0 → don't print
1 w=0+1=1 → me=1 cout << 1
su=su+me = 1 replace 0
0 w=1 → me=0 cout << 0
su=su+me = 10
1 w=1+1=2 → me=1 cout << 1
→ su=su+me = 101
0 w=2 → me=0 cout << 0
→ su=su+me = 1010

1 → fungsi untuk mengubah integer ke string
2 → fungsi untuk mengubah string ke integer
3 → fungsi untuk memutar/membalik string
4 → fungsi untuk mengecek angka nol didepan string