



⇒ **Problem 1**

Write a program that takes an input integer n (assume $n \geq 1$) and prints the value of the sum $1^2 + 2^2 + 3^2 + \dots + n^2$. For example, if the user inputs 3, the program should output the value of $1^2 + 2^2 + 3^2 = 1 + 4 + 9$ which is 14. If the user inputs 5, the program should output the value of $1^2 + 2^2 + 3^2 + 4^2 + 5^2$ which is 55. If the user inputs $n \leq 0$ print "Error".

Input: 1	Output: 1	Input: 2	Output: 5
Input: 3	Output: 14	Input: 4	Output: 30
Input: 5	Output: 55	Input: 10	Output: 385
Input: 0	Output: Error	Input: -5	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0) {cout<<"Error"<<endl; return 0;}
9
10    int sum=0;
11    for(i=1; i<=n; i++) sum+=i*i;
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 2

Write a program that takes an input integer n (assume n is odd and $n \geq 1$) and prints the value of the sum $1 + 3 + 5 + \dots + n$. For example, if the user inputs 5, the program should output the value of $1 + 3 + 5$ which is 9. If the user inputs 9, the program should output the value of $1 + 3 + 5 + 7 + 9$ which is 25. If the user inputs $n \leq 0$ or even value of n print "Error".

Input: 1	Output: 1	Input: 3	Output: 4
Input: 5	Output: 9	Input: 7	Output: 16
Input: 9	Output: 25	Input: 19	Output: 100
Input: -5	Output: Error	Input: 8	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==0) {cout<<"Error"<<endl; return 0;}
9
10    int sum=0;
11    for(i=1; i<=n; i+=2) sum+=i;
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 3

Write a program that takes an input integer n (assume n is even and $n \geq 2$) and prints the value of the sum $2 + 4 + 6 + \dots + n$. For example, if the user inputs 6, the program should output the value of $2 + 4 + 6$ which is 12. If the user inputs 10, the program should output the value of $2 + 4 + 6 + 8 + 10$ which is 30. If the user inputs $n \leq 0$ or odd value of n print "Error".

Input: 2	Output: 2	Input: 4	Output: 6
Input: 6	Output: 12	Input: 8	Output: 20
Input: 10	Output: 30	Input: 20	Output: 110
Input: -2	Output: Error	Input: 3	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==1) {cout<<"Error"<<endl; return 0;}
9
10    int sum=0;
11    for(i=2; i<=n; i+=2) sum+=i;
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 4

Write a program that takes an input integer n (assume $n \geq 1$) and prints the value of the sum $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots + \frac{1}{n^2}$. For example, if the user inputs 3, the program should output the value of $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} = 1 + 0.25 + 0.11$ which is 1.36. If the user inputs 5, the program should output the value of $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2}$ which is 1.46. If the user inputs $n \leq 0$ print "Error".

Input: 1	Output: 1	Input: 2	Output: 1.25
Input: 3	Output: 1.36	Input: 4	Output: 1.42
Input: 5	Output: 1.46	Input: 10	Output: 1.55
Input: 0	Output: Error	Input: -3	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=1; i<=n; i++) sum+=1.0/(i*i);
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 5

Write a program that takes an input integer n (assume n is odd and $n \geq 1$) and prints the value of the sum $\frac{1}{1} + \frac{1}{3} + \frac{1}{5} + \dots + \frac{1}{n}$. For example, if the user inputs 5, the program should output the value of $\frac{1}{1} + \frac{1}{3} + \frac{1}{5} = 1 + 0.33 + 0.20$ which is 1.53. If the user inputs 9, the program should output the value of $\frac{1}{1} + \frac{1}{3} + \frac{1}{5} + \frac{1}{7} + \frac{1}{9}$ which is 1.79. If the user inputs $n \leq 0$ or even value of n print "Error".

Input: 1	Output: 1	Input: 3	Output: 1.33
Input: 5	Output: 1.53	Input: 7	Output: 1.68
Input: 9	Output: 1.79	Input: 19	Output: 2.13
Input: -2	Output: Error	Input: 6	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=1; i<=n; i+=2) sum+=1.0/i;
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 6

Write a program that takes an input integer n (assume n is even and $n \geq 2$) and prints the value of the sum $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \dots + \frac{1}{n}$. For example, if the user inputs 6, the program should output the value of $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} = 0.5 + 0.25 + 0.17$ which is 0.92. If the user inputs 10, the program should output the value of $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8} + \frac{1}{10}$ which is 1.14. If the user inputs $n \leq 0$ or odd value of n print "Error".

Input: 2	Output: 0.5	Input: 4	Output: 0.75
Input: 6	Output: 0.92	Input: 8	Output: 1.04
Input: 10	Output: 1.14	Input: 20	Output: 1.46
Input: -2	Output: Error	Input: 3	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==1) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=2; i<=n; i+=2) sum+=1.0/i;
12    cout<<sum<<endl;
13
14    return 0;
15 }
```

⇒ Problem 7

Write a C++ program that takes an input integer n (assume n is odd and $n \geq 1$) and prints the value of the sum $(\frac{1}{2} + \frac{2}{1})^2 + (\frac{3}{4} + \frac{4}{3})^2 + (\frac{5}{6} + \frac{6}{5})^2 + \dots + (\frac{n}{n+1} + \frac{n+1}{n})^2$. For example, if the user inputs 5, the program should output the value of $(\frac{1}{2} + \frac{2}{1})^2 + (\frac{3}{4} + \frac{4}{3})^2 + (\frac{5}{6} + \frac{6}{5})^2$ which is 14.72. If the user inputs $n \leq 0$ or even value of n print "Error".

Input: 1	Output: 6.25	Input: 3	Output: 10.59
Input: 5	Output: 14.72	Input: 7	Output: 18.80
Input: 9	Output: 22.84	Input: 11	Output: 26.87
Input: 8	Output: Error	Input: -5	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=1; i<=n; i+=2)
12    {
13        double v=(double)i/(i+1)+(double)(i+1)/i;
14        sum+=v*v;
15    }
16    cout<<sum<<endl;
17
18    return 0;
19 }
```

⇒ Problem 8

Write a C++ program that takes an input integer n (assume n is odd and $n \geq 1$) and prints the value of the sum $(\frac{1}{1} + \frac{1}{2})^2 + (\frac{1}{3} + \frac{1}{4})^2 + (\frac{1}{5} + \frac{1}{6})^2 + \dots + (\frac{1}{n} + \frac{1}{n+1})^2$. For example, if the user inputs 5, the program should output the value of $(\frac{1}{1} + \frac{1}{2})^2 + (\frac{1}{3} + \frac{1}{4})^2 + (\frac{1}{5} + \frac{1}{6})^2$ which is 2.72. If the user inputs $n \leq 0$ or even value of n print "Error".

Input: 1	Output: 2.25	Input: 3	Output: 2.59
Input: 5	Output: 2.72	Input: 7	Output: 2.80
Input: 9	Output: 2.84	Input: 11	Output: 2.87
Input: 8	Output: Error	Input: -5	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=1; i<=n; i+=2)
12    {
13        double v=1.0/i+1.0/(i+1);
14        sum+=v*v;
15    }
16    cout<<sum<<endl;
17
18    return 0;
19 }
```


⇒ Problem 9

Write a program that takes an input integer n (assume $n \geq 1$) and prints the value of the sum $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots + \frac{1}{n^2}$. For example, if the user inputs 3, the program should output the value of $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} = 1 - 0.25 + 0.111$ which is 0.861. If the user inputs 5, the program should output the value of $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2}$ which is 0.839. If the user inputs $n \leq 0$ print "Error".

Input: 1	Output: 1	Input: 2	Output: 0.75
Input: 3	Output: 0.861	Input: 4	Output: 0.799
Input: 5	Output: 0.839	Input: 10	Output: 0.826
Input: 0	Output: Error	Input: -3	Output: Error

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0;
11    for(i=1; i<=n; i++)
12    {
13        if(i%2==1) sum+=1.0/(i*i);
14        else sum-=1.0/(i*i);
15    }
16    cout<<sum<<endl;
17
18    return 0;
19 }
```

⇒ **Problem 10**

Write a program that takes an input integer n (assume n is odd and $n \geq 1$) and prints the value of the sum $\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots + \frac{1}{n}$. For example, if the user inputs 5, the program should output the value of $\frac{1}{1} - \frac{1}{3} + \frac{1}{5} = 1 - 0.33 + 0.20$ which is 0.867. If the user inputs 9, the program should output the value of $\frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9}$ which is 0.835. If the user inputs $n \leq 0$ or even value of n print "Error".

Input: 1	Output: 1	Input: 3	Output: 0.667
Input: 5	Output: 0.867	Input: 7	Output: 0.724
Input: 9	Output: 0.835	Input: 19	Output: 0.760
Input: -2	Output: Error	Input: 6	Output: Error

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, n;
7     cin>>n;
8     if(n<=0 || n%2==0) {cout<<"Error"<<endl; return 0;}
9
10    double sum=0; int k=0;
11    for(i=1; i<=n; i+=2)
12    {
13        if(k%2==0) sum+=1.0/i;
14        else sum-=1.0/i;
15        k++;
16    }
17    cout<<sum<<endl;
18
19    return 0;
20 }

```

Another solution:

```

10 double sum=0; int k=1;
11 for(i=1; i<=n; i+=2)
12 {
13     sum+=k*(1.0/i);
14     k=-k;
15 }
16

```

⇒ Problem 11

Write a C++ program (use *switch* statement, do not use *if* statements) that takes two input numbers a , b and a character c . If c is the '+' character, the program should output the value of $a + b$, and similarly for the multiply, divide, and subtract operations as shown in the following examples. If c is not one of these characters: '+', '-', '*', '/' print "Error".

Input: 3.5 4 + Output: 7.5	Input: 9 5 - Output: 4	Input: 5 2 / Output: 2.5	Input: 6 7 = Output: Error
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```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     double a, b;
7     char c;
8     cin>>a>>b>>c;
9
10    switch(c)
11    {
12    case '+': cout<< a+b <<endl; break;
13    case '-': cout<< a-b <<endl; break;
14    case '/': cout<< a/b <<endl; break;
15    case '*': cout<< a*b <<endl; break;
16    default: cout<< "Error" <<endl;
17    }
18
19    return 0;
20 }
```

⇒ **Problem 12**

Write a C++ program that takes an input integer n (where $n \geq 1$) and two characters a and b , and produces n lines of output, the i^{th} line is a sequence of i alternating a and b characters as shown in the following examples. If the user inputs $n \leq 0$ print “Error”.

Input: 4 x y Output: x xy xyx xyxy	Input: 5 * - Output: * *- *-* *-*- *-**	Input: 3 ;) Output: ;););)	Input: 0 s z Output: Error
---------------------------------------------------	-----------------------------------------------------------	-------------------------------------------	----------------------------------

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int n;
7     char a,b;
8     cin>>n>>a>>b;
9     if(n<=0) {cout<<"Error"<<endl; return 0;}
10
11     int i,j;
12
13     for(i=1; i<=n; i++)
14     {
15         for(j=0; j<i; j++)
16         {
17             if(j%2==0) cout<<a;
18             else cout<<b;
19         }
20         cout<<endl;
21     }
22
23     return 0;
24 }

```

⇒ **Problem 13**

Write a C++ program that takes an input integer n (where $n \geq 1$) and two characters a and b , and produces n lines of output, the i^{th} line is a sequence of size i consisting of a or b characters depending on whether i is even or odd as shown in the following examples. If the user inputs $n \leq 0$ print "Error".

Input: 4 x y Output: x YY xxx YYYY	Input: 5 * - Output: * -- *** ---- *****	Input: 3 ;) Output: ;) ; ; ;	Input: 0 s z Output: Error
---------------------------------------------------	------------------------------------------------------------	--------------------------------------------	----------------------------------

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int n;
7     char a,b;
8     cin>>n>>a>>b;
9     if(n<=0) {cout<<"Error"<<endl; return 0;}
10
11     int i,j;
12
13     for(i=1; i<=n; i++)
14     {
15         for(j=0; j<i; j++)
16         {
17             if(i%2==1) cout<<a;
18             else cout<<b;
19         }
20         cout<<endl;
21     }
22
23     return 0;
24 }

```

⇒ **Problem 14**

Write a C++ program that takes two input integers n and m (where $n \geq 3$ and $m \geq 3$) and a character c , and produces a rectangle of height n and width m bordered by the character c as shown in the following examples. If the user inputs $n < 3$ or $m < 3$ print "Error".

Input: 5 4 * Output: **** * * * * * * ****	Input: 4 6 x Output: xxxxxx x x x x xxxxxx	Input: 5 5 o Output: ooooo o o o o o o ooooo	Input: 3 8 # Output: ##### # # #####
--------------------------------------------------------------	-----------------------------------------------------------	----------------------------------------------------------------	--------------------------------------------------

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int i, j, n, m;
7     char c;
8     cin>>n>>m>>c;
9     if(n<3 || m<3) {cout<<"Error"<<endl; return 0;}
10
11     for(j=0; j<m; j++) cout<<c; cout<<endl;
12     for(i=0; i<n-2; i++)
13     {
14         cout<<c; for(j=0; j<m-2; j++) cout<<" "; cout<<c<<endl;
15     }
16     for(j=0; j<m; j++) cout<<c; cout<<endl;
17
18     return 0;
19 }

```

Another solution:

```

11     for(i=0; i<n ;i++)
12     {
13         for(j=0; j<m; j++)
14         {
15             if(i==0 || i==n-1 || j==0 || j==m-1) cout<<c;
16             else cout<<" ";
17         }
18         cout<<endl;
19     }

```