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## DAA Assignment 1

- **Algorithm for calculating SPI**

For SPI:

1. Take input of credits and grades received in each subject.
2. Calculate total grades using formula  $\sum \text{credits}[i] * \text{grades}[i]$  also calculate total credit of all subjects using formula  $\sum \text{credits}[i]$ , where  $i$  is the subject number.
3. Calculate result i.e. SPI using  $(\text{total grades}) / (\text{total credit})$ .

- **Algorithm for calculating CPI**

For CPI:

1. Take input of credits and spi in each semester.
2. Calculate total spi using formula  $\sum \text{credits}[i] * \text{spi}[i]$  also calculate total credit of all subjects using formula  $\sum \text{credits}[i]$ , where  $i$  is the semester number.
3. Calculate result i.e. CPI using  $(\text{total spi}) / (\text{total credit})$ .

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- **Test Cases:**

*1. SPI Test Cases:*

Credits (array)	Grades (array)
1 [3,3,2,3,2]	[10,9,6,7,8]
2 [3,4,3,1,2]	[6,7,7,-2,10]
3 [1,1,1,1,1]	[5,7,5,10,9]
4 [3,4,2,1]	[10,6,7,7]
5 [1,4,5,6,3]	[2,3,4,5,7]

*2. CPI Test Cases:*

SPI:

Credit:

[9.18,8.23,8.15,8.65,8.88,8.92,8.71,9.00]  
[22, 22, 21, 22, 23, 22, 20, 22]

[9.44,9.28,9.45,8.73,9.36,8.84,8.72,9.49]  
[22, 22, 24, 22, 23, 22, 23, 24]

[8.58, 8.56, 9.37, 9.27, 9.45, 8.53, 8.58]  
[22, 24, 22, 22, 22, 22, 24, 23]

[9.3,8.93,9.12,8.97,9.03,9.36,8.64,9.04]  
[23, 23, 22, 24, 24, 22, 23, 24]

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- **CODE:**

```
#include <bits/stdc++.h>
using namespace std;

void spi_calc(){
    //taking input from the user
    cout<<"Enter number of subjects:"<<endl;
    int n;
    cin>>n;
    vector<int> credit(n+1);
    vector<int> grade(n+1);
    for(int i=1;i<n+1;i++){
        cout<<"Enter credit and grade for subject "<<i<<endl;
        cin>>credit[i]>>grade[i];
        if(grade[i]<0){
            cout<<"ERROR! Grade cannot be negative.",
            return;
        }
    }

    //calculation
    int tot_scr=0;
    int tot_cred=0;
    for(int i=1;i<=n;i++){
        tot_scr+=grade[i]*credit[i];
        tot_cred+=credit[i];
    }

    //result
    float SPI=1.0*tot_scr/tot_cred;
```

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```
cout << fixed << setprecision(2) <<"Your spi is: "<<SPI<<endl;
```

```
void cpi_calc(){
    //taking input from the user
    cout<<"Enter number of semester:"<<endl;
    int n;
    cin>>n;
    vector<int> credit(n+1);
    vector<float> spi(n+1);
    for(int i=1;i<n+1;i++){
        cout<<"Enter credit and spi for semester "<<i<<endl;
        cin>>credit[i]>>spi[i];
        if(spi[i]<0){
            cout<<"ERROR! SPI cannot be negative.";
            return;
        }
    }
}
```

```
//calculation
float tot_spi=0;
int tot_cred=0;
for(int i=1;i<=n;i++){
    tot_spi+=spi[i]*credit[i];
    tot_cred+=credit[i];
}
```

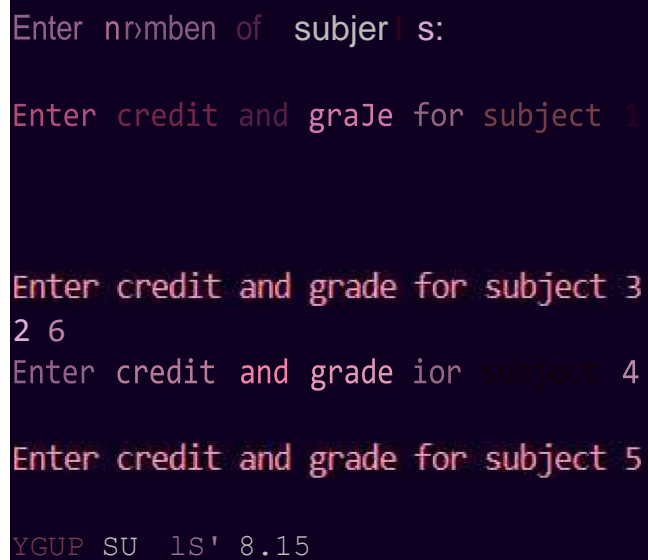
```
//result
float CPI=1.0*tot_spi/tot_cred;
cout << fixed << setprecision(2) <<"Your cpi is:
"<<CPI<<endl;}
```

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```
int main()
{
    spi_calc();
    cpi_calc();
    return 0;
}
```

- Testing for SPI:

TC 1:



```
Enter number of subjects:
Enter credit and grade for subject 1
Enter credit and grade for subject 2
Enter credit and grade for subject 3
2 6
Enter credit and grade for subject 4
Enter credit and grade for subject 5
YOGUP SU 1S' 8.15
```

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TC 2:

```
Enter credit and grade for subject 1
Enter credit and grade for subject 2
4 7
Enter credit and grade for subject 3
3 7
Enter credit and grade for subject 4
1
```

TC 4:

```
Enter credit and grade for subject 2
4 6
Enter credit and grade for subject 3
3 7
Enter credit and grade for subject 4
1 7
your SPI is: 7.50
```

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- Testing for CPI:

TC 1:

```
Enter number of semester:
8
Enter credit and spi for semester 1
22 9.18
Enter credit and spi for semester 2
22 8.23
Enter credit and spi for semester 3
21 8.15
Enter credit and spi for semester 4
22 8.65
Enter credit and spi for semester 5
23 8.88
Enter credit and spi for semester 6
22 8.92
Enter credit and spi for semester 7
20 8.71
Enter credit and spi for semester 8
22 9
Your cpi is: 8.72
```

- Conclusion:  
We studied the algorithm for calculating CPI and SPI.