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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 Σ credits[i]*grades[i]

   also calculate total credit of all subjects using formula Σ credits[i], where i is the subject number.
3. Calculate result i.e. SPI using (total grades)/(total credit).

- **Algorithm for calculating CPI**

For CPI:

1. Take input of credits and spi in each semester.

2. Calculate total spi using formula Σ credits[i]*spi[i] also calculate total credit of all subjects using formula Σ credits[i], where i is the semester number.

3. Calculate result i.e. CPI using (total spi)/(total credit).

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- **Test Cases:**

1. SPI Test Cases:

Credits (array)

1 [3,3,2,3,2]

Grades (array)

[10,9,6,7,8]

2 [3,4,3,1,2]

3 [1,1,1,1,1]

4 [3,4,2,1]

5 [1,4,5,6,3]

2. *CPI Test Cases*:

SPI:

Credit:

[6,7,7,-2,10]

[5,7,5,10,9]

[10,6,7,7]

[2,3,4,5,7]

[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:
5
Enter credit and grade for subject 1
3 10
Enter credit and grade for subject 2 3 9
Enter credit and grade for subject 3
2 6
Enter credit and grade for subject 4 3 7
Enter credit and grade for subject 5 2 8
Your spi is: 8.15
```

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TC 2:

Enter number of subjects:

5

Enter credit and grade for subject 1 3 6

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

-2

ERROR ! Grade cannot be negative.

TC 4:

Enter number of subjects:

4

Enter credit and grade for subject 1

3 10

Enter credit and grade for subject 2 4 6

Enter credit and grade for subject 3

2 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:

B

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.