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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 ∑ credits[i]*grades[i] also calculate total credit of all subjects using formula ∑ 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 ∑ credits[i]*spi[i] also calculate total credit of all subjects using formula ∑ 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)	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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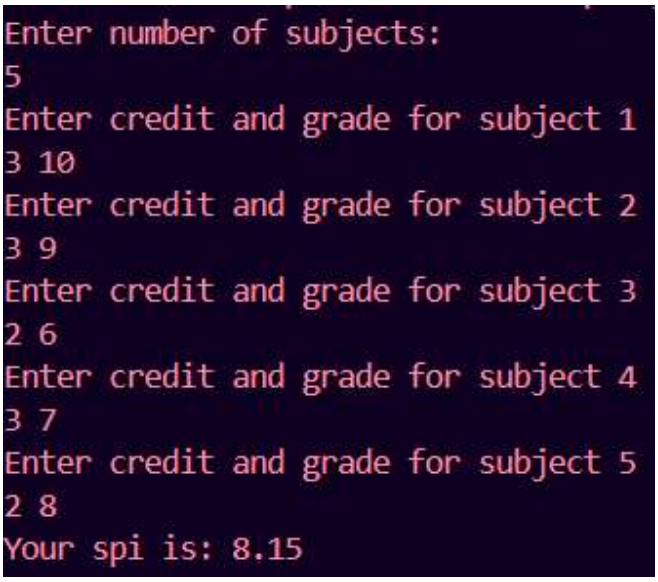
```
int main()
{
    spi_calc();
    cpi_calc();
   return 0;
}
```

- **Testing for SPI:**

  TC 1:



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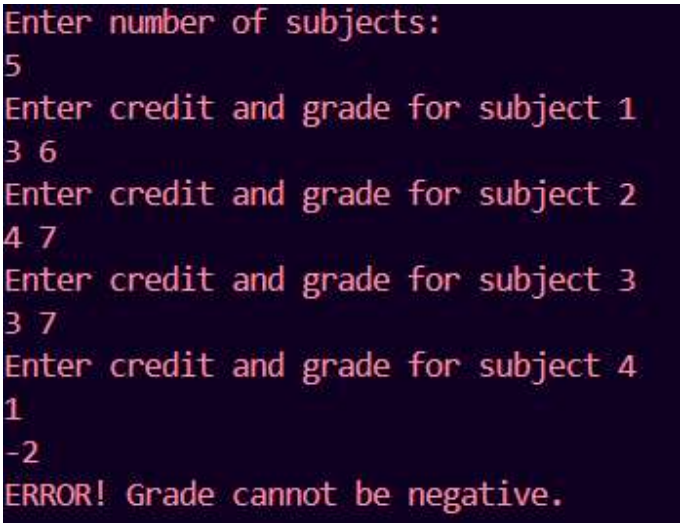
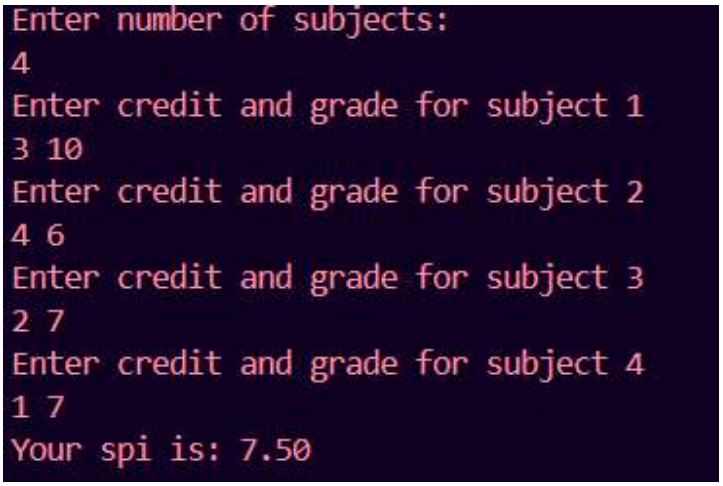
TC 2:



TC 4:



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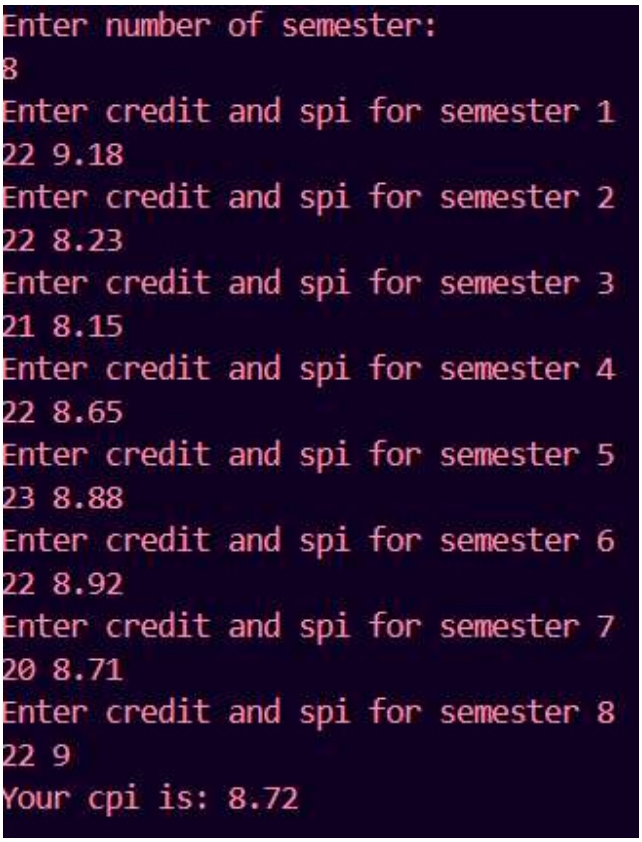
- **Testing for CPI:**

TC 1:



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