

Derivative by Power Rule

Q1. Write a c++ program to calculate the derivative of any function by power rule.

Program:

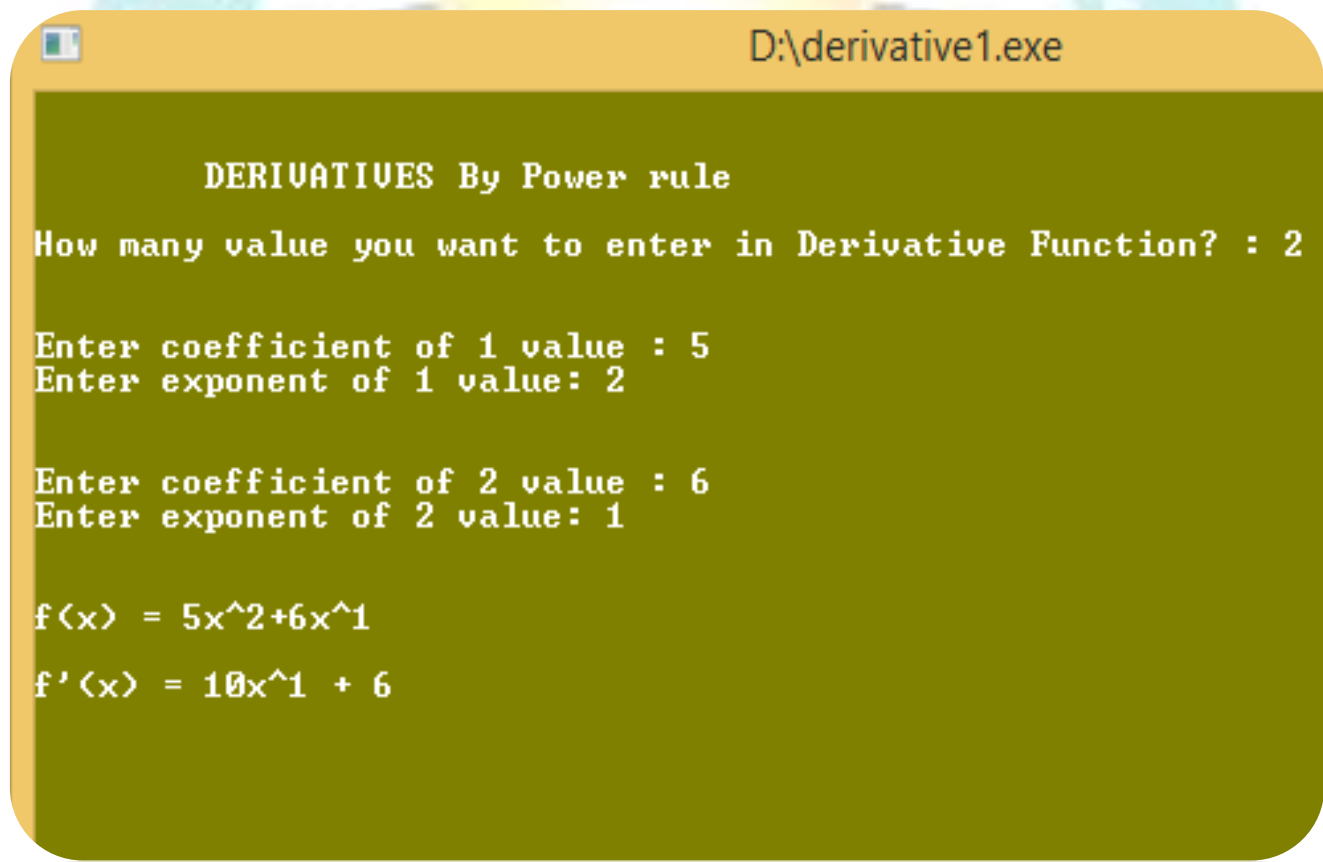
```
#include <iostream>
#include<conio.h>
using namespace std;
int main()
{
    int value;
    cout<< "\n\n\tDERIVATIVES By Power rule";
    cout<< "\n\nHow many value you want to enter in Derivative Function? : ";
    cin>>value;
    int coef[value],exp[value];
    for(int i=0;i<value;i++)
    {
        cout << "\n\nEnter coefficient of "<<i+1<<" value : ";
        cin >> coef[i];
        cout << "Enter exponent of "<<i+1<<" value: ";
        cin >> exp[i];
    }
    cout<< "\n\nf(x) = ";
    for(int i=0;i<value;i++)
    {
        cout<<coef[i]<<"x^"<<exp[i];
        if(i!=value-1)
            cout<<"+";
    }
    int product;
    cout<< "\n\nf'(x) = ";
    for(int i=0;i<value;i++)
    {
        product=coef[i]*exp[i];
```

```

        if(product!=0)
        {
            if(exp[i]-1==0)
                cout<<product;
            else
                cout<<product<<"x^"<<exp[i]-1;
        }
        else
            cout<<0;
        if(i!=(value-1))
            cout<<" + ";
    }
    getch();
    return 0;
}

```

Output console 1:



```

D:\derivative1.exe

DERIVATIVES By Power rule
How many value you want to enter in Derivative Function? : 2

Enter coefficient of 1 value : 5
Enter exponent of 1 value: 2

Enter coefficient of 2 value : 6
Enter exponent of 2 value: 1

f(x) = 5x^2+6x^1
f'(x) = 10x^1 + 6

```

Output console 2:

```
D:\derivative1.exe

DERIVATIVES By Power rule
How many value you want to enter in Derivative Function? : 2
Enter coefficient of 1 value : 4
Enter exponent of 1 value: 9
Enter coefficient of 2 value : 8
Enter exponent of 2 value: 0

f(x) = 4x^9+8x^0
f'(x) = 36x^8 + 0
```

Output console 3:

```
D:\derivative1.exe

DERIVATIVES By Power rule
How many value you want to enter in Derivative Function? : 3
Enter coefficient of 1 value : 3
Enter exponent of 1 value: 2
Enter coefficient of 2 value : 4
Enter exponent of 2 value: 2
Enter coefficient of 3 value : 1
Enter exponent of 3 value: 3

f(x) = 3x^2+4x^2+1x^3
f'(x) = 6x^1+8x^1+3x^2
```

Output console 4:

```
D:\derivative1.exe

DERIVATIVES By Power rule
How many value you want to enter in Derivative Function? : 6
Enter coefficient of 1 value : 4
Enter exponent of 1 value: 5
Enter coefficient of 2 value : 6
Enter exponent of 2 value: 3
Enter coefficient of 3 value : 7
Enter exponent of 3 value: 2
Enter coefficient of 4 value : 6
Enter exponent of 4 value: 7
Enter coefficient of 5 value : 0
Enter exponent of 5 value: 5
Enter coefficient of 6 value : 8
Enter exponent of 6 value: 0

f(x) = 4x^5+6x^3+7x^2+6x^7+0x^5+8x^0
f'(x) = 20x^4 + 18x^2 + 14x^1 + 42x^6 + 0 + 0
```

Integration by parts

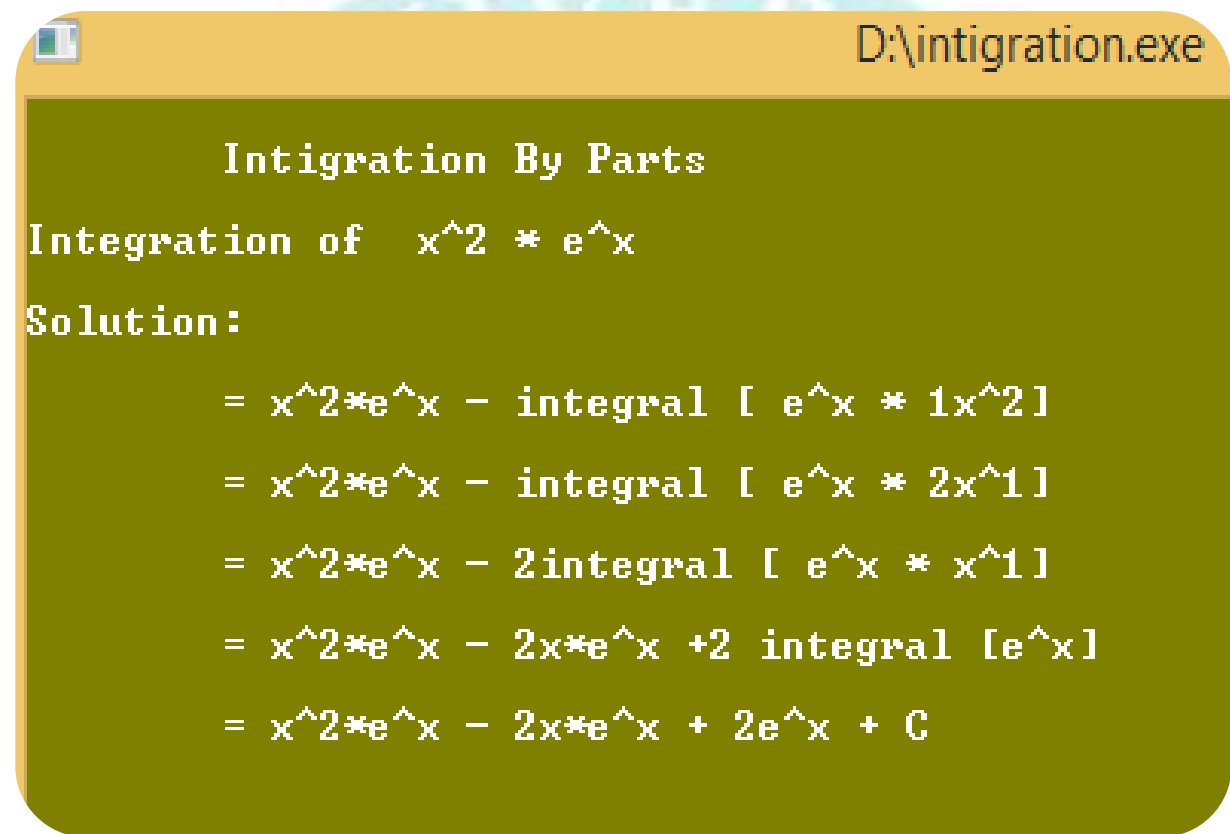
Q2. Write a c++ program to integrate any function by using integration by parts.

Program:

```
#include<iostream>
#include<conio.h>
using namespace std;
int main()
{
    cout<<"\n\tIntigration By Parts";
    cout<<endl<<"\nIntegration of  $x^2 * e^x$ ";
    int cofi,exp;
    cofi=1;
    exp=2;
    cout<<endl<<endl;
    cout<<"Solution: ";
    cout<<endl<<endl;
    for(int i=1;i<=5;i++)
    {
        cout<<"\t="<<"  $x^$ "<<exp<<"* $e^x$  - ";
        if(i==1)
            cout<<"integral [ "<<" $e^x$  * "<<cofi<<" $x^$ "<<exp<<"]";
        else if(i==2)
            cout<<"integral [ "<<" $e^x$  * "<<cofi*exp<<" $x^$ "<<exp-1<<"]";
        else if(i==3)
            cout<<cofi*exp<<"integral [ "<<" $e^x$  * "<<" $x^$ "<<exp-1<<"]";
        else if(i==4)
            cout<<cofi*exp<<" $x^$ "<<" $e^x$  + "<<cofi*exp<<" integral [ "<<" $e^x$ "<<"]";
        else if(i==5)
            cout<<cofi*exp<<" $x^$ "<<" $e^x$  + "<<cofi*exp<<" $e^x$ ";
            if(i!=5)
                cout<<endl<<endl;
    }
}
```

```
cout<<" + C ";  
getch();  
return 0;  
  
}
```

Output console:



```
D:\intigration.exe  
  
Intigration By Parts  
Integration of  x^2 * e^x  
Solution:  
  
= x^2*e^x - integral [ e^x * 1x^2]  
= x^2*e^x - integral [ e^x * 2x^1]  
= x^2*e^x - 2integral [ e^x * x^1]  
= x^2*e^x - 2x*e^x +2 integral [e^x]  
= x^2*e^x - 2x*e^x + 2e^x + C
```