CLASSWORK APPLICATIONS FOR FUNCTIONS-PART 2

Q1. Write a main function and <u>a programmer defined function</u> to <u>calculate the function</u> (given below) and <u>its derivative</u>. \times must be given in the main function. The value of function and its derivative must be displayed in the main function.

Solution:

$$f(x) = 2 + 5x + 3x^2 + 7x^3$$

```
1
     #include<iostream>
2
     using namespace std;
3
4
    void f(double,double&,double&);
5
6 ☐ int main(){
7
         double x,func,der;
8
         cout<<"enter x value\n";</pre>
9
         cin>>x;
10
         f(x,func,der);
11
         cout<<"Value of function= "<<func<<"\n Derivative= "<<der;</pre>
12
         3
13
14 🖵 void f(double x,double &func,double &der){
15
         func=2+5*x+3*x*x+7*x*x*;
         der=5+6*x+21*x*x;
16
17
         ł
```

Q2. Write a C++ program to calculate the shear stress (τ) and twist angle (θ) of a circular shaft. The calculations must be done in a function named as SHAFT. The torque (*T*), length (*L*), radius (*r*) and modulus of rigidity (*G*) of the shaft must be given in the main function. The result must be displayed in the main function.

$$\tau = \frac{Tr}{J}$$
 $\theta = \frac{TL}{JG}$ $J = \frac{\pi r^4}{32}$

Solution:

```
#include<iostream>
2
    #include<cmath>
3
    using namespace std;
4
5
6
    void SHAFT(double,double,double,double&,double&);
7 □ int main(){
        double T,L,r,G,shear,twist;
8
9
        cout<<"enter torque(T), length(L), radius(r) and modulus of rigidity(G)\n";</pre>
10
        cin>>T>>L>>r>>G;
1
        SHAFT(T,L,r,G,shear,twist);
12
        cout<<"Shear Stress= "<<shear<<"\n Twist angle= "<<twist;</pre>
L3
        }
4
L5  void SHAFT(double T,double L,double r,double G,double&shear,double&twist){
16
        double j;
۲7
        j=M_PI*pow(r,4)/32;
8
        shear=T*r/j;
۱9
        twist=T*L/(j*G);
20
```

Q3. Write a C++ program to calculate the total surface area and the volume of a cylinder in a function named as CYLINDER. The height, and radius of the base are input from the keyboard in the main function. The <u>outputs must be displayed in the CYLINDER function</u>.



Surface area=2*Base Area+2*Side Area

Solution:

Volume = Base area*Height

```
#include<iostream>
1
2
    #include<cmath>
3
    using namespace std;
4
5
    void CYLINDER(double,double);
6
7 □ int main(){
8
         double r,h;
9
         cout<<"enter radius(r) and height(h) of cylinder\n";</pre>
10
         cin>>r>>h;
1
         CYLINDER(r,h);
12
         }
13
L4 🖵 void CYLINDER(double r,double h){
15
         cout<<"Surface area= "<<2*M_PI*r*r+2*2*M_PI*r*h<<endl;</pre>
16
         cout<<"Volume= "<<M_PI*r*r*h;</pre>
17
```

Q4. Write a programmer defined C++ function to calculate summation of the numbers up to a given number and the factorial of this number. The main function is only used to call the function. All inputs and outputs must be given in the programmer defined function.

```
1
2
                #include<iostream>
Solution:
               #include<cmath>
           3
               using namespace std;
           4
           5
               void sumfac(int);
           6
           7 [ int main(){
           8
                    int x=2;
                    sumfac(x);
           9
           10
                    3
          11
          12 🖵 void sumfac(int x){
           13
                    int sum=0,fac=1;
           14
                    cout<<"enter a number\n";</pre>
          15
                    cin>>x;
                    for(int i=1;i<=x;i++){</pre>
          16白
          17
                        sum=sum+i;
          18
                        fac=fac*i;
           19
                    3
           20
                    cout<<"Summation of the numbers up to given number= "<<sum<<endl;</pre>
                    cout<<"Factorial of given number= "<<fac;</pre>
           21
          22
```

Q5. Write the function "sum" for the main function given below. It calculates the summation of its parameters and returns the results:

```
#include <iostream>
#include <cmath>
using namespace std;
int main() {
    cout<<sum(2,3)<<endl;
    cout<<sum(5,8,10)<<endl;
    cout<<sum(1,5,9,12)<<endl;
}
}</pre>
```

Solution:

int sum(int a,int b,int c=0,int d=0){
 return a+b+c+d;

Q6. Find the output of the following program (without compiling).

```
#include <iostream>
#include <cmath>
using namespace std;
int p(int a,int b=1,int c=4){
  return a+b+c;
}
int main(){
    int x=3;
    cout<<p(x)<<endl;
    cout<<p(x,2*x)<<endl;
    cout<<p(x,2*x,3*x)<<endl;
    system("pause");
}</pre>
```

Solution:

13 18

8

Q7. Find the output of the following program (without compiling).

```
#include <iostream>
using namespace std;
int p(int m, int n) {
    switch(m) {
    case(1):return n-1;break;
    case(2):return n+1;break;
    default:return 0;}}
double p(double x, double y) {
    if(x>y)return x+y;
    else return x-y; }
int main() {
    double a=1.5;
    for(int k=1; k<=2; k++) {</pre>
    cout << p(k, 2*k) << endl;
    cout<<p(a, k*a)<<endl; }
    system("pause");}
```



5 -1.5