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#include <iostream>  
#include "cmath"  
using namespace std;  
  
int addition() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 return a + b;  
}  
  
int subtraction() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 return a - b;  
}  
  
int multiplication() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 return a \* b;  
}  
  
int division() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 if (b == 0) {  
 cout << "You can't devide a number by zero."<<endl;  
 return 0;  
 } else {  
 return a / b;  
 }  
}  
  
int remainder() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 return a % b;  
}  
  
int average() {  
 int a,b;  
 cout<< "Input two numbers:-"<<endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 return (a + b) / 2;  
}  
  
long double factorial() {  
 int n;  
 long double factorial = 1.0;  
 cout << "Enter a positive integer: ";  
 cin >> n;  
 if (n < 0) {  
 cout << "Error! Factorial of a negative number doesn't exist.";  
 } else {  
 for (int i = 1; i <= n; ++i) {  
 factorial \*= i;  
 }  
 cout << "Factorial of " << n << " = " << factorial;  
 }  
 return factorial;  
}  
  
int summation() {  
 int a, b, c;  
 cout << "Enter three integers: " << endl;  
 cin >> a;  
 cout << "\n";  
 cin >> b;  
 cout << "\n";  
 cin >> c;  
  
 return a + b + c;  
}  
  
double area\_of\_triangle() {  
 double base, height, area;  
 cout << "Enter base and height respectively: " << endl;  
 cin >> base >> height;  
 area = (0.5) \* height \* base;  
  
 return area;  
}  
  
double area\_of\_rectangle() {  
 double length, width, area;  
 cout << "Enter length and width respectively: " << endl;  
 cin >> length >> width;  
 area = length \* width;  
 return area;  
}  
  
double area\_of\_square() {  
 double side, area;  
 cout << "Enter the height of a side: " << endl;  
 cin >> side;  
 area = side \* side;  
  
 return area;  
}  
  
double area\_of\_circle() {  
 const double PI = 3.14;  
 double radius, area;  
 cout << "Enter the radius of the circle: " << endl;  
 cin >> radius;  
 area = PI \* (radius \* radius);  
  
 return area;  
}  
  
void root\_of\_quadratic\_function() {  
 float a, b, c, x1, x2, discriminant, realPart, imaginaryPart;  
 cout << "Enter coefficients a, b and c: ";  
 cin >> a >> b >> c;  
 discriminant = b\*b - 4\*a\*c;  
  
 if (discriminant > 0) {  
 x1 = (-b + sqrt(discriminant)) / (2\*a);  
 x2 = (-b - sqrt(discriminant)) / (2\*a);  
 cout << "Roots are real and different." << endl;  
 cout << "x1 = " << x1 << endl;  
 cout << "x2 = " << x2 << endl;  
 }  
  
 else if (discriminant == 0) {  
 cout << "Roots are real and same." << endl;  
 x1 = -b/(2\*a);  
 cout << "x1 = x2 =" << x1 << endl;  
 }  
  
 else {  
 realPart = -b/(2\*a);  
 imaginaryPart =sqrt(-discriminant)/(2\*a);  
 cout << "Roots are complex and different." << endl;  
 cout << "x1 = " << realPart << "+" << imaginaryPart << "i" << endl;  
 cout << "x2 = " << realPart << "-" << imaginaryPart << "i" << endl;  
 }  
}  
  
void fibonacci\_series() {  
 int n, t1 = 0, t2 = 1, nextTerm = 0;  
  
 cout << "Enter the number of terms: ";  
 cin >> n;  
  
 cout << "Fibonacci Series: ";  
  
 for (int i = 1; i <= n; ++i) {  
 // Prints the first two terms.  
 if(i == 1) {  
 cout << t1 << ", ";  
 continue;  
 }  
 if(i == 2) {  
 cout << t2 << ", ";  
 continue;  
 }  
 nextTerm = t1 + t2;  
 t1 = t2;  
 t2 = nextTerm;  
  
 cout << nextTerm << ", ";  
 }  
}  
  
int main() {  
 int choice;  
 cout << "\nSimple Mathematical Aided Application" << endl;  
 cout << "Choose a function by typing the number." << endl;  
 cout << " 0.Exit \n 1. Addition \n 2.Subtraction \n 3.Multiplication \n 4.Division \n 5.Reminder \n 6.Average \n 7.Factorial \n 8. Summation \n 9. Area of Triangle \n 10. Area of Rectangle \n 11. Area of Square \n 12. Area of Circle \n 13. Root for Quadratic Equation \n 14. Fibonacci Series \n" << endl;  
 cin >> choice;  
 switch (choice) {  
 case 0:  
 cout << "\nThank you! have a good day!";  
 exit(0);  
 case 1:  
 cout << addition();  
 break;  
 case 2:  
 cout << subtraction();  
 break;  
 case 3:  
 cout << multiplication();  
 break;  
 case 4:  
 cout << division();  
 break;  
 case 5:  
 cout << remainder();  
 break;  
 case 6:  
 cout << average();  
 break;  
 case 7:  
 cout << factorial();  
 break;  
 case 8:  
 cout << summation();  
 break;  
 case 9:  
 cout << area\_of\_triangle();  
 break;  
 case 10:  
 cout << area\_of\_rectangle();  
 break;  
 case 11:  
 cout << area\_of\_square();  
 break;  
 case 12:  
 cout << area\_of\_circle();  
 break;  
 case 13:  
 root\_of\_quadratic\_function();  
 break;  
 case 14:  
 fibonacci\_series();  
 break;  
 default:  
 cout << "Oops! invalid input";  
 break;  
 }  
  
 main();  
  
 return 0;  
}