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[CPSC 230]

Chapter 3 - Homework

Note: Submit your assignment document in the inbox (chapter 3 HW).

Q1- (5 pts.)
An approximate value of pi can be calculated using the series given below:

$pi = 4 [1 - 1/3 + 1/5 - 1/7 + 1/9 ... + ((-1)^n) / (2n+1)]$

Write a C++ program to calculate the approximate value of pi using this series. The program takes an input n that determines the number of terms in the approximation of the value of pi and outputs the approximation. Include a loop that allows the user to repeat this calculation for new values n until the user says she or he wants to end the program.

```
//CPSC 230 RAVI PATEL CH 3 HW Q1
#include <iostream>
#include <cmath>

using namespace std;
int main(int argc, char *argv[]) {

int n;
double result = 0.0, pi;
char c;

do{

     cout << "Enter a number: ";
     cin >> n;
     cout << "\n";

     pi = 0.0;
     result = 0.0;

     if (n > 0){
          for (int i = 0; i <= n; i++){

               result = result + pow(-1, i) / (2 * i + 1); //calculate pi

           }

               pi = result * 4; //calculate pi
               cout << "PI @ number n = " << pi;
               cout << "\n";


     }

     else { //if n is negative

          cout << "Not a valid number.";
          cout << "\n";
```

```
     }

               cout << "Repeat calculations for n? 'y' for yes: ";
               cin >> c;

 } while (c == 'y' || c == 'Y');

 cout << "Thank you for using pi calculator!";


}
```

```
//SAMPLE OUTPUT:
//Enter a number: 12
//
//PI @ number n = 3.2184
//Repeat calculations for n? 'y' for yes: n
//Thank you for using pi calculator!
```

Q2- (5 pts.)

Use the compound interest equation to calculate the interest amount annually and semiannually. Write a test program to output the interest after 5 years, 6 years, 7 years, 8 years, 9 years and 10 years (for the annual and semiannual). Consider the principle amount =$ 20,000 and the interest rate is 1%. Arrange your results in a tabular form.

```
 //CPSC 230 RAVI PATEL INTEREST CALCULATOR
//Leaving extra code in program for future reference, ignore commented lines
#include <iostream>
#include <cmath>

using namespace std;
int main(int argc, char *argv[]) {

float principal = 20000, rate = 1, t, amount, rates, interest, semi_amount,
semi_interest;
char c;

do{
//   cout << "What is the Principal Amount ($): ";
//   cin >> principal;
//   cout << "What is the Interest Rate (%): ";
//   cin >> rate;
     cout << "Interest after how many years? : "; //ask user input
     cin >> t; //assign user input
     rates = rate/100; //assign rate to a percentage
     amount = principal * pow(1.0 + rates / t,t); //calculate interest
     semi_amount = principal * pow(1.0 + (rates/2) / t,t); //calculate semi-annual
interest
     interest = amount - principal; //calculate interest
     semi_interest = semi_amount - principal; //calculate semi-annual interest
//   cout<<"\nInterest Rate:        "<<rate<<"%";
//   cout<<"\nYears Compounded:     "<<t<<" years";
//   cout<<"\nPrincipal Amount:     $"<<principal;
     cout<<"\nAnnual Interest:      $"<<interest;
     cout<<"\nSemi-Annual Interest: $"<<semi_interest;
cin.get();
cout << "\nContinue using interest calculator? 'y' for yes: ";
cin >> c;
```

```
} while (c == 'y' || c == 'Y');
return 0;
}

//SAMPLE OUTPUT:
//Interest after how many years? : 5
//
//Annual Interest:      $200.801
//Semi-Annual Interest: $100.199
//Continue using interest calculator? 'y' for yes: y
//Interest after how many years? : 6
//
//Annual Interest:      $200.836
//Semi-Annual Interest: $100.209
//Continue using interest calculator? 'y' for yes: y
//Interest after how many years? : 7
//
//Annual Interest:      $200.859
//Semi-Annual Interest: $100.215
//Continue using interest calculator? 'y' for yes: y
//Interest after how many years? : 8
//
//Annual Interest:      $200.877
//Semi-Annual Interest: $100.219
//Continue using interest calculator? 'y' for yes: y
//Interest after how many years? : 9
//
//Annual Interest:      $200.891
//Semi-Annual Interest: $100.223
//Continue using interest calculator? 'y' for yes: y
//Interest after how many years? : 10
//
//Annual Interest:      $200.902
//Semi-Annual Interest: $100.225
//Continue using interest calculator? 'y' for yes: n
```

Q3-Choose the correct answer: (8pts.)

1. Which of the following symbols has the highest precedence?
   a. ++
   b. ||
   c. &&
   d. -

   ANSWER: **A - ++**

2. If a programming language does not use short-circuit evaluation, what is the output of the following code fragment if the value of myInt is 0?

```
int other=3, myInt;

if(myInt !=0 && other % myInt !=0)

        cout << "other is odd\n";

else
```

```
cout << "other is even\n";
```

a. other is even
b. other is odd
c. 0
d. run-time error, no output

ANSWER: **D - run-time error, no output**

3. What is the value of the following expression?
```
( true && (4/3 || !(6)))
```

a. true
b. false
c. 0
d. illegal syntax

ANSWER: **A - true**

4. if x is 0, what is the value of (!x ==0)?
a. false
b. true
c. unable to determine
d. A

ANSWER: **A - false**

5. Which of the following are equivalent to (!(x<15 && y>=3))?
a. (x>15 && y<=3)
b. (x>=15 && y < 3)
c. (x>=15 || y < 3)
d. (x>15 || y < 3)
e. C and D

ANSWER: **C - (x>=15 || y < 3)**

6. Which of the following boolean expressions tests to see if x is between 2 and 15 (including 2 and 15)?
a. (x<=15 || x>=2)
b. (2 <=x || x <=15)
c. (x >=2 && x <=15)
d. (2 <= x <= 15)

ANSWER: **C - (x >=2 && x <=15)**

7. Given the following enumerated data type definition, what is the value of SAT?
```
enum myType{SUN,MON,TUE,WED,THUR,FRI,SAT,NumDays};
```

a. 7
b. 6
c. 8
d. 5
e. unknown

ANSWER: **B - 6**

8. Given the following enumerated data type definition, what is the value of SAT?
   enum myType{SUN=3,MON=1,TUE=3,WED,THUR,FRI,SAT,NumDays};

   a. 7
   b. 6
   c. 8
   d. 5
   e. unknown

   ANSWER: **A - 7**

Q4- True or false: (2pts.)

1. All switch statements can be converted into nested if-else statements
   ANSWER: **TRUE**

2. All nested if-else statements can be converted into switch statements.
   ANSWER: **FALSE**

3. A break statement in a switch stops your program.
   ANSWER: **FALSE**