Assignment # 4	A201-A505 Object Oriented Programming (VB .Net) Procedures and Functions	H. Hakimzadeh 20 Pts. Due Nov. 2, 2016
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Analyzing a loan payment:

The process of paying off a loan is called amortization. A table that shows the sequence of balances as the loan is being paid off is called an amortization table. You are to design a **console mode** program which calculates the amortization table for a car loan.

A car loan is affected by the following numbers:

- The Price (Also known as Principal of the loan)
- The Term (Length of the loan in years).
- The Interest Rate on the loan (expressed as an annual rate).

The following represents a set of typical parameters which affect the loan:

Principal	\$2000.00
Annual interest	8%
Periods per year	1 12
No. of Payments	12
Monthly Payment	\$173.98

The following is a sample amortization table:

Pmt No.	Beginning Balance	Interest	Principal	Ending Balance	Interest to Date
1	2000.00	13.33	160.64	1839.36	13.33
2	1839.36	12.26	161.71	1677.64	25.60
3	1677.64	11.18	162.79	1514.85	36.78
4	1514.85	10.10	163.88	1350.97	46.88

Problem Definition:

Write a program which prompts the user to enter the principal, annual interest rate, the number of years and the number of periods per year. Then using this information, calculate the monthly payment for the loan. The formula for calculating the loan is as follows:

Note:

Periodic_Interest_Rate = Annual interest rate / Periods per year Term = Years * Periods per year

The following procedures and functions are needed to implement the amortization program. We will work on some of the sub programs in class.

Procedures:

ReadLoanInfo(Principal, Rate, Years, Period) PrintLoanInfo(Principal, Rate, Monthly_Payment, Years, Period) PrintAmortizationSchedule(Principal, Rate, Years, Period)

Functions:

Payment(Principal, Rate, Years, Period) as double

Basically, all input, output and calculations should be done in the procedures and functions. The main body of the program should be a series of subroutine calls.

Review the chapter(s) on procedures and functions, pass by value and pass by reference in our notes, and text book before attempting this program. Also, make sure to review/complete relevant labs such as lab 5, 9 and 10 before starting this program.

What to hand in:

1) Project directory (zipped)

Make sure to documentation your code, including documentation for the procedures and functions also make sure that Option Strict and Explicit are turned on. Upload the zipped project folder on to canvas.

2) Testing:

Make sure to test your final program with the following set of data and include the results in a word document and upload that to the **drop box**.

Principal	Rate	Year	Period
11000.00	10.00%	4	12
15500.00	05.70%	3	12
5100.00	18.00%	2	12

(For more information on amortization see http://en.wikipedia.org/wiki/Amortization)

NOTE: USE LAB 10 as your starting point for this assignment.

```
•_____
'Loan Amortization
•-----
'Name:
             H. Hakimzadeh
'Date:
             March 15, 2008
'Homework # : 4
'Source File:
'Action:
              Given the principal, interest rate, and term, calculate the monthly payment
              and print the amortization table for a loan.
·_____
Option Explicit On
Option Strict On
 _____
Module Module1
   Sub Main()
      Dim Principal As Double = 0.0
      Dim AnnualIntRate As Double = 0.0
       Dim TermInYears As Integer = 0
      Dim MonthlyPayment As Double = 0.0
       Dim PeriodsPerYear As Integer = 0
       ReadLoanInfo(Principal, AnnualIntRate, TermInYears, PeriodsPerYear)
      MonthlyPayment = Payment(Principal, AnnualIntRate, TermInYears, PeriodsPerYear)
       PrintLoanInfo(Principal, AnnualIntRate, TermInYears, PeriodsPerYear, MonthlyPayment)
       PrintAmortization(Principal, AnnualIntRate, TermInYears, PeriodsPerYear, MonthlyPayment)
       Console.ReadLine()
   End Sub
   'Action: Read the loan information and pass it back to the main program.
                 Principal, AnnualIntRate, TermInYears, PeriodsPerYear
   'Parameters
   'IN:
                 Principal, AnnualIntRate, TermInYears, PeriodsPerYear
   'OUT:
                 Principal, AnnualIntRate, TermInYears, PeriodsPerYear
    'Returns:
                 The parameters passed by reference will be returned back to the
                 calling procedure (In this case the main program).
   'Precondition:
   Sub ReadLoanInfo(ByRef Principal As Double,
                  ByRef AnnualIntRate As Double, _
                  ByRef TermInYears As Integer,
                  ByRef PeriodsPerYear As Integer)
       Console.Write("Enter Principal:
                                         ")
       Principal = CDbl(Console.ReadLine())
       Console.Write("Enter Annual Int. Rate: (e.g., 8.25% type 8.25")
       AnnualIntRate = CDbl(Console.ReadLine()) / 100
       Console.Write("Enter Term (in years): ")
       TermInYears = CInt(Console.ReadLine())
       Console.Write("Enter Periods per Year: (typically this is 12 for the number of months in the year)")
      PeriodsPerYear = CInt(Console.ReadLine())
   End Sub
    .
   'Action: Calculate the monthly payment
                 This function is similar the built-in PMT() function provided by VB
   'Parameters
                Principal, AnnualIntRate, TermInYears, PeriodsPerYear
   'TN:
                 Principal, AnnualIntRate, TermInYears, PeriodsPerYear
                 NONE
   'OUT:
```

```
'Returns:
                Monthly Payment
'Precondition: Values passed to the function must be accurate
Function Payment(ByVal Principal As Double,
                 ByVal AnnualIntRate As Double, _
                 ByVal TermInYears As Integer,
                 ByVal PeriodsPerYear As Integer) As Double
   Dim MtlyPayment As Double
   Dim PeriodicIntRate As Double
   Dim TermInMonths As Integer
    TermInMonths = TermInYears * PeriodsPerYear
    PeriodicIntRate = AnnualIntRate / PeriodsPerYear
   MtlyPayment = Complete the rest of this line..... Look at the formula in the assignment sheet for guidance
    Return MtlyPayment
End Function
'Action: Print the loan information (including the monthly payment amount)
'Parameters
             Principal, AnnualIntRate, TermInYears As Integer, PeriodsPerYear, MtlyPmt
                Principal, AnnualIntRate, TermInYears As Integer, PeriodsPerYear, MtlyPmt
'IN:
'OUT:
                NONE
'Returns:
              NONE
'Precondition: Values passed to the procedure are expected to be accurate
Sub PrintLoanInfo(DECIDE PASS BY VALUE OR REFERENCE Principal As Double,
                  DECIDE PASS BY VALUE OR REFERENCE AnnualIntRate As Double, _
                  DECIDE PASS BY VALUE OR REFERENCE TermInYears As Integer,
                  DECIDE PASS BY VALUE OR REFERENCE PeriodsPerYear As Integer,
                  DECIDE PASS BY VALUE OR REFERENCE MtlyPmt As Double)
   Console.WriteLine("------")
Console.WriteLine("Principal = {0}", Principal)
Console.WriteLine("Annual Int. Rate = {0}", AnnualIntRate)
Console.WriteLine("Term (in years) = {0}", TermInYears)
Console.WriteLine("Periods per Year = {0}", PeriodsPerYear)
    Console.WriteLine("Monthly Payment = {0,11:c}", MtlyPmt)
    Console.WriteLine("-----")
End Sub
·_____
'Action:Print the Amortization Table'Calculate and display the month by month amortization of the loan.
                Principal, AnnualIntRate, TermInYears As Integer, PeriodsPerYear, MtlyPmt
'Parameters
               Principal, AnnualIntRate, TermInYears As Integer, PeriodsPerYear, MtlyPmt
'TN:
'OUT:
                NONE
'Returns:
                NONE
'Precondition: Values passed to the procedure are expected to be accurate
Private Sub PrintAmortization(DECIDE PASS BY VALUE OR REFERENCE Principal As Double,
                               DECIDE PASS BY VALUE OR REFERENCE AnnualIntRate As Double, _
                               DECIDE PASS BY VALUE OR REFERENCE TermInYears As Integer,
                               DECIDE PASS BY VALUE OR REFERENCE PeriodsPerYear As Integer, _
                              DECIDE PASS BY VALUE OR REFERENCE MtlyPmt As Double)
    Dim MtlyIntRate As Double
    Dim TermInMonths As Integer
   Dim PaymentNo As Integer
    Dim BegBal As Double
    Dim InterestThisMonth As Double
    Dim PrincipalThisMonth As Double
    Dim EndBal As Double
    Dim IntToDate As Double = 0.0
```

BegBal = DETERMINE THE BEGINNING BALANCE FOR THE NEXT MONTH

Next PaymentNo

End Sub

End Module

Sample Output

File:///C:/A_Data/Visual_Studio_Projects/Visual_Basic/00_Complete_Applications/Consol						
Enter Enter Enter Enter	Principal: Annual Int. Term (in ye Periods per	2000 Rate: 8 ars): 1 Year: 12				
Princ Annua Term Perioo Month	ipal l Int. Rate (in years) ds per Year ly Payment	= 2000 = 0.08 = 1 = 12 = \$173.9	8			
Pmt No.	Begining Balance	Interest This Month	Principal This Month	Ending Balance	Interest To Date	
 123456789 10112	52,000.00 51,839.36 51,677.64 51,514.85 51,350.97 51,186.00 51,019.93 5852.75 5684.46 5515.05 5344.50 5172.82	\$13.33 \$12.26 \$11.18 \$10.10 \$9.01 \$7.91 \$6.80 \$5.69 \$4.56 \$3.43 \$2.30 \$1.15	\$160.64 \$161.71 \$162.79 \$163.88 \$164.97 \$166.07 \$166.07 \$167.18 \$168.29 \$169.41 \$170.54 \$171.68 \$172.82	$\begin{array}{c}\\ \$1, \$39.36\\ \$1, 677.64\\ \$1, 514.85\\ \$1, 350.97\\ \$1, 350.97\\ \$1, 186.00\\ \$1, 019.93\\ \$852.75\\ \$684.46\\ \$515.05\\ \$544.50\\ \$344.50\\ \$172.82\\ \$0.00\\ \end{array}$	\$13.33 \$25.60 \$36.88 \$55.89 \$63.79 \$70.59 \$76.28 \$80.84 \$84.27 \$86.57 \$87.72	
•			III			H.

Hacker's Corner: Convert the above program to a Windows Application.