

## CS 210 - Fundamentals of Programming I

### Spring 2019 - In-class Exercise 3 for 01/24/2019

The purpose of this exercise is to continue working with functions. It is based on the Chapter 3 Programming Project 1 on page 167 of the textbook that will be covered in lecture today. An **empty** CodeBlocks project should be created for this exercise, and the main program file **loanpayment.c** should be downloaded from the course website to the project folder, then add the file to the project as demonstrated in class. Type your name into the file heading comment. **DO NOT CHANGE** the name of the file.

#### Problem Statement

Many new college graduates borrow money to buy their first car. The cost of borrowing money is computed using an interest rate, usually expressed as an annual percentage rate (APR). The length of a loan usually is expressed as the number of monthly payments to be paid (e.g., 36, 48, or 60 months for a car loan). In order to know whether the graduate can afford a particular car, she needs to know how much her monthly loan payments will be. The formula for computing a monthly loan payment (for any kind of loan with interest compounded monthly) is

$$payment = \frac{iP}{1 - (1+i)^{-n}}$$

where

- $P$  = principal (the amount borrowed)
- $i$  = **monthly** interest rate (1/12 of the APR)
- $n$  = total number of payments

#### Program Specifications

Write a program that computes the monthly payment of a loan. The program should prompt the user for the purchase price, a down payment amount, the annual interest rate (in decimal form, e.g. .05 for 5%), and the total number of monthly payments. It should display the amount borrowed and the monthly loan payment including a dollar sign and exactly two decimal places. Your program should interact with the user in exactly the manner shown below (user input shown in **bold**).

```
LOAN PAYMENT CALCULATOR
```

```
Enter the purchase price: 18000  
Enter the down payment: 2000  
Enter the annual interest rate (in decimal form): .07  
Enter the total number of monthly payments: 60
```

```
The amount borrowed is $16000.00  
The monthly payment will be $316.82
```

#### Analysis & Design

Covered in today's lecture.

Name: \_\_\_\_\_

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### Assignment

1. (6 points) Complete this program using the analysis and design developed in today's lecture. That is, you must implement the program exactly as designed in class. In particular, you must provide:

- Prototypes for functions `print_results` and `compute_loan_payment` declaring these functions before the main program.
- Definitions for functions `print_results` and `compute_loan_payment` implementing these functions after the main program.
- A function call to `compute_loan_payment` in the main program to compute the monthly loan payment for the input values.
- A function call to `print_results` in the main program to display the results to the screen as shown.

Build and test your program until you are confident that it is correct. When you have completed the program, make sure you have put your name in the comment at the beginning of the program and create a zipfile containing the file `loanpayment.c`. Submit the zipfile to the submission system as demonstrated under assignment 02-IN3. You should resubmit until your program passes all the tests.

2. (4 points) Write the answers to the following questions regarding this program in the spaces that follow.

- a) What is the return type of the function `compute_loan_payment`? Why?
- b) What is the return type of the function `print_results`? Why?
- c) With respect to function `compute_loan_payment`, which variables are (actual) arguments?
- d) With respect to function `compute_loan_payment`, which variables are (formal) parameters?

Turn in this exercise sheet with your answers to the questions at the end of class. Be sure to write your name at the top of this page. REMINDER: once you have finished today's exercise, you are expected to work on Project 1 and/or Homework 2 for the rest of the class period. If you have successfully completed both assignments, you are free to go.