

Student Name _____ Section _____

Instructor _____ Due Date _____

Project	1	2	3	4	5	6	TOTAL
<i>Maximum Points</i>	2 points	2 points	2 points	2 points	1 point	1 point	10 points
<i>Your Score</i>							

PROJECT ONE (Peterson Parking Garage)

Objective To construct a function which receives user - input information and then outputs data into a tabular report format.

PROJECT DESCRIPTION

You have been hired as the programmer for the Peterson Parking Garage. The company wants you to write a program that generates a report showing each parking garage customer's charge by car number and the daily total charges and daily total hours for all the cars which were parked in the garage for a particular day.

The parking garage charges a \$ 5.00 minimum fee to park up to 3 hours. The garage also charges an additional \$ 0.75 per hour for every hour or part thereof in excess of 3 hours. The maximum charge for any given 24 - hour period however is \$ 15.00 . You are to assume that no automobile parks beyond the 24 - hour period.

Write program code that will print the car number, number of hours parked, and charge for 5 particular customers who parked their cars in the garage on Monday (7/07/03).

Program this project in the following three step format.

STEP 1 First, construct a loop which will allow for user input and also will call your function to calculate the time charges and then output the information into a report.

STEP 2 Second, prompt the user to input the following:

- Number of Hours Parked

STEP 3 Set up a function (called `calc_charges`) to receive the following information (as parameters):

- Car number
- Hours

Have your function calculate the charge for each car. Also have your function output the car number, hours and charge for each car, on a car by car basis. An example of output follows in **Figure 1** .

A good idea would be to create some initial column headings for your report before printing the individual customer information. Perhaps in your first iteration into your loop you can set up your headings to appear only once in your report.

Information About This Project

This project combines the three program controls; namely sequential, selection and looping and then calls a function which performs computations and displays the necessary output.

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PROJECT ONE**Steps To Complete This Project****STEP 1 Code the Program**

Write the necessary program code that will receive the proper input, process the necessary data and then output the required report.

Include your name, assignment number, date, course number and instructor name in the heading portion of your program code.

STEP 2 Compile and Run your Program

Build, compile and run your program. Test the operation of your program.

STEP 3 Print your Program Code and your Run Time Output

When completed, print your program source code as well your program output. Submit the hardcopies for credit.

Figure 1 Peterson Parking Garage - Sample Output**Peterson Parking Garage
Daily Parking Report
7/07/04 (Monday)**

Car Number	Hours	Charge
1	2.50	\$ 5.00
2	4.00	\$ 5.75
3	24.00	\$ 15.00
4	6.50	\$ 8.00
5	3.25	\$ 5.75

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PROJECT TWO (Using Structures)

Objective To write, compile and execute a C or C++ program which contains a simple structure.

PROJECT DESCRIPTION

Write, compile and execute a C or C++ program that uses a structure named `EmpInfo` to keep track of employee information (i.e., an employee database) such as an employee name, salary and job title. In your code, initialize at least 5 employees including initializations for the employee's salary and title. Also, include hardcopy of your entire employee database.

Information About This Project

The general form of a structure is:

```
struct name(optional)
{
    //assign members
    data type member 1; //member declaration(s) -not initialization
    data type member 2;
    .
    .
    .
    data type member n;
}
variable 1, variable 2, variable n; //optional variable declaration(s)
//may initialize members here
```

Steps To Complete This Project**STEP 1 Code the Program**

Code this project according to the following instructions:

First, type your preprocessing directives by including `<iostream>`, `<iomanip>` and `<stdlib>`.

Declare the variable `MAXNAME` as an integer constant and initialize the variable to 15. Declare the variable `TITLE` as an integer constant and initialize the variable to 20.

Declare a `struct` named `EmpInfo` having three data members; two of which called `name` and `title` are to be of character data type and are to have a maximum size of `MAXNAME` and `TITLE`, respectively. The other data member of the structure called `salary` is to be declared as a float type.

Within your `main()` function, declare the variable `NUMRECS` as an integer constant initialized to 5. Also, declare `count` as an integer.

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PROJECT TWO

Declare an array named `employee` whose size is `NUMRECS`, for the maximum number of employee records to be initialized. Within the array declaration, add the following employees and their respective salaries and titles. The array will be initialized with respect to the `EmpInfo` structure.

Employee	Salary	Title
Terry Thompson	\$ 25,000.00	Technician
Rhonda Reynolds	\$ 30,000.00	Receptionist
Sally Sanders	\$ 53,000.00	Supervisor
Peter Ponce	\$ 42,000.00	Programmer
Ann Andrews	\$ 45,000.00	Analyst

After initializing the structure and array, the next step is to code the output of the program. Your code is to display to the user a three column report having the column labels **Employee**, **Salary** and **Title**. One line after the column labels, your code is to display, in a line - by - line fashion, each of the `NUMRECS` records in the `employee` array. Use a `for` loop and the counter variable `count` to display the records. Use the `dot` operator in order for the `employee` array to access individually the data type attributes of the `name`, `salary` and `title` data members of the structure. Set the width of the `name`, `salary` and `title` variables to be 20, 15 and 20, respectively. Display any numeric amounts in the currency format of a dollar sign \$ and two decimal places.

Include your name, assignment number, date, course number and instructor name in the heading portion of your program code.

STEP 2 Compile and Run your Program

Build, compile and run your program. Test the operation of your program.

STEP 3 Print your Program Code and your Run Time Output

When completed, print your program source code as well your program output. Submit the hardcopies for credit.

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PROJECT THREE (The Guessing Game)

Objective To use the C++ random generator function `rand()` to generate pseudo-random numbers.

PROJECT DESCRIPTION

Write a program that allows a user to play the game of "guessing a number" as follows:

Your code chooses a number to be guessed by randomly selecting an integer in the range of 1 to 20. The program then prints the following to the screen:

```
I have a number between 1 and 20.  
Can you guess it?  
Please type your first guess.
```

The user then types a first guess. Your program then responds with one of the following choices:

1. Excellent! You guessed the correct number!
Would you like to play again (y or n)?
2. Too low. Please try again.
3. Too high. Please try again.

Your program should continue looping until the player guesses correctly. Your program should display Too high or Too low to the user until the right number is entered.

A partially completed program is provided within **Figure 1**. Finish coding the program that follows and run a sample program till the correct answer is found.

Note: there are comment sections in the given program which indicates what to specifically complete.

Information About This Project

This program implements the `rand()` function. The general format for scaling and shifting a random number is:

```
n = a + rand() % b;
```

where *a* is the shifting value (equal to the first number in the desired range of consecutive integers) and *b* is the scaling factor (equal to the width of the desired range of consecutive integers).

Steps To Complete This Project**STEP 1 Open Visual C++ and Complete the Program Code**

Open MS Visual C++ on your computer. Complete the program code in **Figure 1** that will allow the user to enter the necessary input items and then use these items to compute the required output value(s).

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PROJECT THREE**STEP 2 Compile and Run your Program**

Build, compile and run your program. Test the operation of your program.

STEP 3 Print your Program Code and your Run Time Output

When completed, print your program source code as well your program output. Submit the hardcopies for credit.

Include your name, course information and data in the heading portion of your program code.

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PROJECT THREE**Figure 1 Partially Completed Guessing Game Code**

```
#include <iostream.h>
#include <stdlib.h> //Header file for call to functions RAND, SRAND
#include <time.h> //Header file for call to TIME function

void guessingGame(void);

main()
{
    srand(time(NULL));
    guessingGame();
    return 0;
}

void guessingGame(void)
{
    int x, guess, response;
    do {
        //assign an integer value to variable x that is in the range of 1 to 20
        x = ;

        cout << endl << "Welcome: the guessing game. \nI have a number from 1"
            << "and 20." << endl << "Can you guess it?" << endl
            << "Please type your first guess." << endl << "? ";
        cin >> guess;

        // Complete the while loop condition to allow the user to continue and
        // input another guess if necessary

        while ( ) {
            if (guess < x )

                // Complete cout statements that tell the user if they are too high or
                // too low
                cout << ;
            else
                cout << ;

            cin >> guess;
        }
        cout << endl << "Great job - you guessed the correct number!" << endl
            << "Would you like to try again?" << endl << "Please type "
            << "(1 = yes, 2 = no)? ";
        cin >> response;

    } //complete the while condition to allow the user to play again
    while ( );
}
```

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PROJECT FOUR (Payroll Processing)**Objective** To create a sequential file for processing payroll.**PROJECT DESCRIPTION**

- (1) Create a sequential file that contains five employee last names, employee numbers, hourly rates and hours worked.
- (2) Write a program that reads the data file created in step (1), computes each employee's gross pay (hours worked * hourly rate) and then displays a payroll report containing each employee's gross pay, employee number, hours worked, and hourly rate.

Information About This Project

This program utilizes a sequential file which contains payrolls records.

Steps To Complete This Project**STEP 1 Open Notepad and Create a Sequential File.**Open Notepad, the Windows[®] text editor. Type the following sample payroll records into a new text document.**Figure 1 Sequential Data File**

```
Andrews 800 8.75 40
Manning 805 9.20 38
Simon 802 10.15 40
Travers 837 15.82 35
Washington 858 12.10 40
```

Save the file as payroll.dat.

STEP 2 Write the Program Code

Write the program code that reads the records of the data file payroll.dat and computes the required amounts. The output of your program should be in the form of a 5 - column professional report, containing the column headings Name, Number, Rate, Hours and Gross Pay followed by the individual payroll records. Display any numerical amounts in a currency format, with a dollar sign and two decimal places.

STEP 3 Print your Program Code and your Run Time OutputWhen completed, print your program source code as well your program output. Submit the hardcopies for credit.

Include your name, course information and data in the heading portion of your program code.

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PROJECT FIVE (Sequential File Processing)

Objective To create a sequential file called `average.dat` then use the data in the file to compute various averages from the data.

PROJECT DESCRIPTION

Write a program to calculate and display the average of each group of numbers in the file `average.dat`. The data in the file are arranged so that each group of numbers is preceded by the number of data items in the group.

For example:

The first number in the file, 5, indicates that the next five numbers should be added together as a group then averaged. The number 4 indicates that the following four numbers are in a group, so they should be added then averaged, and 6 indicates that the last six numbers are in a group, so add and average them.

Hint: A good idea would be to use a nested loop to process the data...the outer loop should terminate when maybe the EOF (end of file marker) is encountered.

Information About This Project

This program utilizes a sequential file which contains payrolls records.

Steps To Complete This Project**STEP 1 Open Notepad and Create a Sequential File.**

Open Notepad, the Windows[®] text editor. Type the following sample payroll records into a new text document.

Figure 1 Sequential Data File

```
5 96 87 78 93 21 4 92 82 85 87 6 72 69 85 75 81 73
```

Save the file as `average.dat`.

STEP 2 Write the Program Code

Write the program code that reads the records of the data file `average.dat` and then outputs the required amounts.

STEP 3 Print your Program Code and your Run Time Output

When completed, print your program source code as well your program output. Submit the hardcopies for credit.

Include your name, course information and data in the heading portion of your program code.

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PROJECT SIX (Bin Packing)

Objective To write, compile and execute a program that solves a management science problem.

PROJECT DESCRIPTION

Shipping clerks at Sedgwick Specialty Services pack the company's top selling item (hand-held portable, personal communicators) in special containers. These containers are available in four sizes: giant, large, medium and small, which can hold 50, 20, 5 and 1 of these communicators, respectively.

Write a program that reads the number of communicators to be shipped and displays the number of giant, large, medium and small containers needed to send the shipment in the minimum number of containers, and with the minimal amount of unused space. Use constant definitions for the number of communicators each type of container can hold. The output of your program should be similar to the following.

container type	number of containers
-----	-----
Giant	21
Large	2
Medium	1
Small	3

Execute (Test) your program separately for 3, 19, 46, 75 and 1538 communicators.

Information About This Project

This program illustrates an example of management science and bin packing.

Steps To Complete This Project**STEP 1 Open a C or C++ Text Editor and Code the Program**

Open a C or C++ text editor and write the program code that will prompt the user to enter the number of communicators to be packed and then displays the required output.

Build, compile and run your program. Test your program.

STEP 2 Print Your Program Code

Print your program code and attach it to this lab packet for credit.

Include for submission, a run time image of your program showing the results of running your programming individually for 3, 19, 46, 75 and 1538 communicators.