CSC 211

Final Problem Set

May 6, 2005

Name:

Due: Monday, May 16th by noon

This is an optional problem set covering material from the entire semester. You may choose to do any of the following problems, I will only grade problems that have been attempted. For example, if you attempt problem 3 and get 4/5 and problem 4 and get 5/5, then your total grade will be 9/10. I will count this grade as an additional homework grade. I will answer questions about the problems in class on Monday. The problem set is due by noon on Monday, May 16th. You may drop off your answers in my mailbox on the third floor of Tyler Hall (preferred) or e-mail me your answers.
1. (6 points) Definitions

Define the following terms. Use your own words and as much detail as you think is necessary (I do not want a straight out of the book answer!)

a. (2 pts) Object

b. (2 pts) Class

c. (2 pts) Object-Oriented Programming
2. (8 points) Short Answer
Answer the following questions. Again, use your own words and as much detail as you think is necessary.

a. (2 pts) How does the quality of design affect the total cost of developing and maintaining software?

b. (2 pts) Describe the purpose of comments.

c. (2 pts) What is the difference between object declaration an object creation?

d. (2 pts) Describe the difference between pass by reference and pass by value. Give and example of each.
3. (5 points) Class Design

Imagine that you have been asked to design a registration system for the Department of Motor Vehicles. The system keeps track of all licenses vehicles and drivers. The system should represent different vehicles (car, motorcycle, etc.) and drivers (class A for commercial licenses and class B for towing vehicles, etc.). Create a class design for the registration system (hint: be sure to use inheritance).
4. (5 points) Selection Statements

Write a method that takes a year as a parameter and returns true if the year is a leap year and false otherwise. A year is a leap year if it is divisible by 4 but not by 100. A year that is divisible by 4 and 100 is a leap year if it is also divisible by 400.
5. (10 points) Class Implementation

a. (5 pts) Create a class Die to represent a die. The die can have a value from 1 to 6. Include methods to create the die, roll the die (randomly generate a value between 1 and 6), and get the value of the die.
b. (5 pts) Create a main class which contains two die objects. Ask the user for a number between 2 and 12. Roll the dice until they sum to that number and print out the number of rolls it took.
Write a method that takes as parameters a number n and an array of integers and returns the number of integers in the array less than n. For example, if n=5 and the array contains the values 4, 10, 7, 3, 10, 9, the method would return 2.
Write a recursive method to compute the greatest common divisor (GCD) of two integer values. The GCD of two integers is derived using the following rules:

\[ GCD(i,j) = \]
\[ \begin{align*}
& i \text{ if } j = 0 \\
& GCD(j, i \mod j) \text{ if } j \neq 0
\end{align*} \]