CIS 130 - Intro to Programming - Fall 2005
Homework Assignment #3

Homework #3:
HW #3 PART 1 is due by **12:00 NOON** on **Wednesday, September 21, 2005;**
HW #3 PART 2 is due by **12:00 NOON** on **Friday, September 23, 2005**

Week "4" Lab Exercise - due at end of your registered lab section
on either 9-16 or 9-19

WEEK "4" LAB EXERCISE

1. Follow these steps to obtain and set up a copy of **funct_play1** in your directory:
    a.   Use ssh to connect to cs-server, and log onto your cs-server account (remember to use your NHW 244 password).

    b.   While in your home directory (where you are when you first log in), do the following commands, all at the cs-server prompt (explanation is in Times New Roman font, commands you are to type are in `Courier New`):

        Copy **funct_play1** from my account into your **bin** directory:
        `cp  ~st10/bin/funct_play1  bin`

        Make your new copy of **funct_play1** executable:
        `chmod  700  bin/funct_play1`

    c.   Now try typing **funct_play1** at the cs-server prompt, followed by typing the enter key. If you see the tool's greeting, you are set!

        (If you don't --- try logging off, then on again, and try again. If that doesn't work, ask for help!)

        Remember to answer **n** (for no) when asked if you are creating a function that doesn't use other functions, and answer **y** (for yes) when asked if you are creating a function that does use other functions.

2. (Adapted from a problem by Susan Barocas)
    (a) Write a **contract** for a function that finds the number of inches in a given number of feet.

    (b) Write a **contract** and a **header** for a function that determines the gas consumption (miles per gallon) for a particular vehicle.

(c) Write a **contract**, **header**, and **purpose statement** for a function that expects the length, width, and depth of a tank, and returns its volume.

(d) Write a **contract**, **header**, **purpose statement** and **two examples** for a function that expects five quiz grades for a student and returns the quiz average.

(e) Write a **contract**, **header**, **purpose statement**, **two examples**, and the **body** for a function that expects the amount of money that a family spends on groceries per week and that computes the yearly cost of groceries for that family.

3. (Adapted from www.htdp.org) Demonstrate that you are able to use your new **funct_play1** --- first use the design recipe steps **on-paper** to develop a function that, when given the **area** of a **square**, will calculate and return its **perimeter**. Then use **funct_play1** to enter those

elements and your function. To receive credit, all of the design recipe elements must be reasonably entered in, and you must test your completed function on at least all of your Example calls.

When you have completed the above, put your name on the **Next:** list so that I can check your work. The above must be completed, and your work checked, by the end of your registered lab section.

HOMEWORK #3

You are to work **individually** on this assignment.

PART 1: (30% of the HW #3 grade) You must create a file **130hw3_part1.txt** on cs-server. Inside this file, type the numbers **1.** through **10.** , and after each number, type in the **contract** you have developed for each of the functions to be written for problems **1** through **10** below.

You must submit this file using ~st10/130submit (typed at the cs-server prompt, from the directory where your 130hw3_part1.txt file resides!!) by **12:00 noon** on **Wednesday, September 21st** to receive **any** credit for Part 1 of HW #3.

PART 2: (70% of the HW #3 grade) Finish problems **1** through **10** below. For this part, we are in the unusual part of the semester in which you are using tools that automatically send me information, so running **funct_play1** successfully from cs-server will automatically "turn in" Part 2 of HW #3. Enjoy this while it lasts... 8-)

PLEASE NOTE: You are now REQUIRED to use the **program design recipe** for all functions, from here on out, and your functions need to each include the program design recipe elements (including contract, purpose, and specific examples).

1.   Complete the development of the function described in Lab Exercise #2**(e)** above. When you are ready, you must use **funct_play1** to enter your design recipe elements and function; use either **expr_play** or **funct_play1** to test all of your examples (and run any further tests you would like).

2.   Complete the development of the function described in Lab Exercise #2**(d)** above. You must use **funct_play1** to enter your design recipe elements and function; use either **expr_play** or **funct_play1** to test all of your examples (and run any further tests you would like).

3.   Complete the development of the function described in Lab Exercise #2**(c)** above. You must use **funct_play1** to enter your design recipe elements and function; use either **expr_play** or **funct_play1** to test all of your examples (making sure that there are at least **two** examples) (and run any further tests you would like)

4.   Complete the development of the function described in Lab Exercise #2**(b)** above. You must use **funct_play1** to enter your design recipe elements and function; use either **expr_play** or **funct_play1** to test all of your examples (making sure that there are at least **two** examples) (and run any further tests you would like)

5.   Complete the development of the function described in Lab Exercise #2**(a)** above. You must use **funct_play1** to enter your design recipe elements and function; use either **expr_play** or

funct_play1 to test all of your examples (making sure that there are at least **two** examples) (and run any further tests you would like)

6.   (Adapted from a problem by Stephen Bloch, Adelph University) Develop the function **total_inches**. This function expects as parameters a length represented by two numbers: the first is a number of feet, and the second a number of inches. The function returns the total length in inches.

   You must use **funct_play1** to enter your design recipe elements and function, and you must include at least **three** proper examples in your Examples section. You may use either **expr_play** or **funct_play1** to test all of your Examples (and run any further tests you'd like).

7.   (Adapted from a problem by Karen O'Loughlin, Ankeny High School) Develop the function **semester_grade**. A semester grade is computed from a cumulative homework score, a cumulative quizzes score, and a final exam score, weighted as follows: 50% homework, 30% quizzes, and 20% final exam. This function should compute and return the semester grade.

   You must use **funct_play1** to enter your design recipe elements and function, and you must include at least **three** proper examples in your Examples section. You may use either **expr_play** or **funct_play1** to test all of your Examples (and run any further tests you'd like).

8.   (Adapted from www.htdp.org) Ms. Sis Y. Fuss wants to push a rock up a hill. The distance is d yards. In one minute, she pushes the rock 30 yards, but then it slides down 4 yards. When she has reached d yards, it won't slide down anymore. How many (entire) minutes will it take her?

   Develop a function to solve the above problem; you must use **funct_play1** to enter your design recipe elements and function, and you must include at least **three** proper examples in your Examples section. You may use either **expr_play** or **funct_play1** to test all of your Examples (and run any further tests you'd like).

9.   (Adapted from www.htdp.org) Develop a function that, when given the length and width of a rectangular floor and the edge length of a square tile will compute the whole number of tiles needed to cover the floor completely.

   You must use **funct_play1** to enter your design recipe elements and function, and you must include at least three proper examples in your Examples section. You may use either **expr_play** or **funct_play1** to test all of your Examples (and run any further tests you'd like).

10. (Adapted from www.htdp.org) Develop a function that computes how long after their departure two trains will meet. Assume that the trains travel between two points, along a single section of track, going in opposite directions. The function should expect the trains' speeds and the starting distance between the trains. Speed is distance/time.

   You must use **funct_play1** to enter your design recipe elements and function, and you must include at least three proper examples in your Examples section. You may use either **expr_play** or **funct_play1** to test all of your Examples (and run any further tests you'd like).