

**60-140-1 and 60-140-2 ASSIGNMENT #2 SOLUTION**  
**Handed Out: Thurs. Oct 1, 2015 for (60-140-01 and 60-140-02)**  
**Due: Thurs Oct 8, 2015 for (60-140-01 and 60-140-02)**  
**Total: 50 marks**

---

**Objective of Assignment:** To write an algorithm and a C program to solve a problem using no decision or repetition and no function calls, but going through all 6 problem solving steps.

**Scope:** Assignment covers materials up until end of chapter 3.

**Other Things to learn from Assignment :** How to trace through an algorithm or program with hand, use of C's increment and decrement operators, operator assign operations and output formatting

**Important:** Do not forget to type in your *full name, student number, lecture section number* and *date* in BOTH the algorithm and source C program files.

**Electronic Assignment Submission:**

**03-60-140-1 students: email script file to cs140\_01@cs.uwindsor.ca with subject including: Name, student id, lecture section, lab [section], assignment #2 (in the subject of the mail submission of script file).**

**03-60-140-2 students: email script file to cs140\_02@cs.uwindsor.ca with subject including: Name, student id, lecture section, lab [section], assignment #2 (in the subject of the mail submission of script file).**

\*Only the assignments currently due that are submitted to this site within two days before and by the due date, are retrieved for marking. Others are deleted soon after.

---

**CONFIDENTIALITY AGREEMENT & STATEMENT OF HONESTY**

I confirm that I will keep the content of this assignment/examination confidential.

I confirm that I have not received any unauthorized assistance in preparing for or doing this assignment/examination. I confirm knowing that a mark of 0 may be assigned for copied work.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Student Name (please print)

\_\_\_\_\_  
Student I.D. Number

\_\_\_\_\_  
Date

---

**Problem:**

Write a program by going through the 6 problem solving steps that reads in the length and width of a rectangular yard in feet, the length and width of a rectangular house located in the yard in feet, and calculates and displays the time required to cut the grass in the yard at the rate of **2 square feet per second** (we assume that the part of the yard that is not covered by the house is covered by grass and needs to be cut). The computed time has to be given in **Hours, Minutes, and Seconds**. Your program should also print the areas (length \* width) of (i) the yard, (ii) the house and (iii) the grass area in both square feet and square meter. Your program is also required to print the perimeters ( $2 * (\text{length} + \text{width})$ ) of (i) the yard and (ii) the house in both feet and meter. Note that 1 (foot) feet is equal to 0.3048 meter.

As done in class (Chapter 2), and Laboratory Exercise 2, you are required to write the **Six Problem solving Steps (RCMACT)** (1. *Requirements analysis (or problem definition)*, 2. *Components Analysis Phase*, 3. *Modular Design Phase*, 4. *Algorithm Design Phase*, 5. *Coding Phase*, and 6. *Testing and verification*).

- Type all six problem solving steps in a text file called your `userid_asn2.txt`
- Type the C program solution into a source file called your `userid_asn2.c`
- Compile your C program with `cc userid_asn2.c (cc userid_asn2.c -lm`, if you include the math library in your program)
- Run (execute it with `./a.out`). When your program is running with no errors, Create a script file called `userid_script2.txt` and hand in your script file for marking as follows

```
script userid_script2.txt
cat userid_asn2.txt
cat userid_asn2.c
cc userid_asn2.c
./a.out
```

[note here when prompted by the cpu, enter the input data from the keyboard as your program has asked to read it and the result will be displayed on the monitor and captured in the script file].  
exit

### **Important**

Your script file should show ALL **six** problem solving steps including the algorithm, your source program, the compilation of the program, the running of the program with the input and output data shown.

### **Sample Input Data:**

<i>What is the length of the rectangular yard?</i>	<i>: 200.00</i>
<i>What is the width of the rectangular yard?</i>	<i>: 100.00</i>
<i>Please scan in the length of the rectangular house</i>	<i>:180.00</i>
<i>Please scan in the width of the rectangular house</i>	<i>:80.00</i>

### **Your output should be (Note:can present the areas and perimeters up to 2 decimal places):**

*The time required to cut the grass in the yard is: 0 hours 46 minutes 40 seconds.*

*The area of the yard in square feet is: 20000.00 sq. ft.*

*The area of the yard in square meter is: 1858.06 sq. meter.*

*The area of the house in square feet is: 14400.00 sq. ft.*

*The area of the house in square meter is: 1337.80 sq. meter.*

*The area of the grass area in square feet is: 5600.00 sq. ft.*

*The area of the grass area in square meter is: 520.26 sq. meter.*

*The perimeter of the yard in feet is: 600.00 ft.*

*The perimeter of the yard in meter is: 182.88 meter.*

*The perimeter of the house in feet is: 520.00 ft.*

*The perimeter of the house in meter is: 158.50 meter.*

*Thank you for using our property evaluation software !!*

*Have a great day!*

**Marking Scheme:**

- **Steps 1 and 2** (Requirement & Components analysis) -- (7 marks)
- **Step 3** Top Down Design (Not needed for this assignment)
- **Step 4** (Correct Algorithm) -- (8 marks)
- **Step 5** Coding in C -- (25 marks)
  - Correct Program Solution -- (25 marks)
    - Variable declarations -- 5
    - Reading (scanning) and Printing (displaying)-- 5
    - Correct logic -- 5
  - Error free Compilation of Program -- 5
  - Correct execution With right Input/Output -- 5
- **Step 6** Hand tracing the program for testing and evaluation -- (10 marks)

**Reminder Notes:**

- State **your name, Course Lecture Section and Your Course Lab Section** as well as **your Instructor** on the Assignment submission email subject or Envelope so that your assignment does not get sent to the wrong lab and your marks can always be found. Also include confidentiality agreement and statement of honesty.



## Solution

```
Script started on Mon 07 Sep 2015 08:04:31 PM EDT
cezeife@bravo:~/fall15/assignmt$ cat cezeife_asn2.txt
/* This presents the 6 problem solving steps for Assignment 2 solution
   for 60-140 for Fall 2015.
*/
```

### Step 1: Requirements Analysis (Problem Definition):

Write a program by going through the 6 problem solving steps that reads in the length and width of a rectangular yard in feet, the length and width of a rectangular house located in the yard in feet, and calculates and displays the time required to cut the grass in the yard at the rate of 2 square feet per second (we assume that the part of the yard that is not covered by the house is covered by grass and needs to be cut). The computed time has to be given in Hours- Min-Seconds. Your program should also print the areas (length \* width) of the yard, the house and the grass area in both square feet and square meter as well as the perimeters ( $2 * (\text{length} + \text{width})$ ) of the yard and the house in both feet and meter. Note that 1 (foot) feet is equal to 0.3048 meter.

### Step 2: Component Analysis:

#### Input Data Set:

```
Real length_yard;          /* Length of the rectangular yard */
Real length_house;        /* Length of the rectangular house*/
Real width_yard;          /* Widht of the rectangular yard */
Real width_house;        /* Width of the rectangular house */
const Real fttometer = 0.3048; /* 1 ft = 0.3048 meter */
```

#### Output Data Set:

```
integer hours;           /*Number of hours required to cut the grass */
integer minutes;        /*Number of minutes required to cut the grass*/
integer seconds;        /*Number of seconds required to cut the grass*/

real area_yard_ft;      /*Area of the yard in ft */
real area_yard_mt;      /*Area of the yard in meter */
real area_house_ft;     /*Area of the house in ft */
real area_house_mt;     /*Area of the house in meter */
real area_grass_ft;     /*Area of the grass in ft */
real area_grass_mt;     /*Area of the grass in meter */

real peri_yard_ft;      /*perim of the yard in ft */
real peri_yard_mt;      /*perim of the yard in meter */
real peri_house_ft;     /*perim of the house in ft */
real peri_house_mt;     /*perim of the house in meter */
```

#### Intermediate Data Set:

```
integer total_time;     /*Total time in seconds, to cut the grass*/
```

#### Relationships:

```
/****** COMPUTE THE AREA and perimeter OF THE YARD *****/
area_yard_ft = length_yard * width_yard;
```

```

area_yard_mt = (length_yard * fttometer) * (width_yard * fttometer);
peri_yard_ft = 2 * (length_yard + width_yard);
peri_yard_mt = 2 * ((length_yard * fttometer) + (width_yard * fttometer)
);

/***** COMPUTE THE AREA and perimeter OF THE HOUSE *****/
area_house_ft = length_house * width_house;
area_house_mt = (length_house * fttometer) * (width_house * fttometer);
peri_house_ft = 2 * (length_house + width_house);
peri_house_mt = 2 * ((length_house * fttometer) + (width_house * fttomet
er));

/***** COMPUTE THE AREA OF THE GRASS *****/
area_grass_ft = area_yard_ft - area_house_ft;
area_grass_mt = area_yard_mt - area_house_mt;

;

/***** THE TIME REQUIRED TO CUT THE GRASS IN SECONDS *****/
total_time = (int) area_grass_ft / RATE ;

/***** THE NUMBER OF HOURS REQUIRED TO CUT THE GRASS IN SECONDS *****/
hours=total_time / 3600;

/***** THE NUMBER OF MINUTES REQUIRED TO CUT THE GRASS IN SECONDS *****/
minutes =(total_time % 3600)/60 ;

/***** THE REMAINED NUMBER OF SECONDS REQUIRED TO CUT THE GRASS IN SECONDS **
****/
seconds=( total_time%3600 ) % 60;

```

Step 3: Module Break Down: Problem is not broken down into modules.

Step 4: Algorithm Design.

MainAlgorithm

{

Input Data Set:

```

real length_yard;          /* Length of the rectangular yard */
real length_house;        /* Length of the rectangular house*/
real width_yard;          /* Widht of the rectangular yard */
real width_house;        /* Width of the rectangular house */
const real fttometer = 0.3048; /* 1 ft = 0.3048 meter */
const real RATE = 2.0;

```

Output Data Set:

Output Data Set:

```

integer hours;          /*Number of hours required to cut the grass */
integer minutes;       /*Number of minutes required to cut the grass*/
integer seconds;       /*Number of seconds required to cut the grass*/

real area_yard_ft;     /*Area of the yard in ft */

```

```

real area_yard_mt;           /*Area of the yard in meter */
real area_house_ft;         /*Area of the house in ft */
real area_house_mt;         /*Area of the house in meter */
real area_grass_ft;         /*Area of the grass in ft */
real area_grass_mt;         /*Area of the grass in meter */

real peri_yard_ft;          /*perim of the yard in ft */
real peri_yard_mt;          /*perim of the yard in meter */
real peri_house_ft;         /*perim of the house in ft */

Intermediate Data Set:
integer total_time;        /*Total time in seconds, to cut the grass*/

/* Sequence of Steps */

/* Get the length of the yard*/
print("What is the length of the rectangular yard?:");
read(length_yard);

/* Get the width of the yard*/
print("What is the width of the rectangular yard?:");
read(width_yard);

/* Get the length of the yard*/
print("Please scan in the length of the rectangular house:");
read(length_house);

/* Get the width of the yard*/
print("Please scan in the width of the rectangular house\t:");
read(width_house);

/***** COMPUTE THE AREA and perimeter OF THE YARD *****/
area_yard_ft = length_yard * width_yard;
area_yard_mt = (length_yard * fttometer) * (width_yard * fttometer);
peri_yard_ft = 2 * (length_yard + width_yard);
peri_yard_mt = 2 * ((length_yard * fttometer) + (width_yard * fttometer)
);

/***** COMPUTE THE AREA and perimeter OF THE HOUSE *****/
area_house_ft = length_house * width_house;
area_house_mt = (length_house * fttometer) * (width_house * fttometer);
peri_house_ft = 2 * (length_house + width_house);
peri_house_mt = 2 * ((length_house * fttometer) + (width_house * fttomet
er));

/***** COMPUTE THE AREA OF THE GRASS *****/
area_grass_ft = area_yard_ft - area_house_ft;
area_grass_mt = area_yard_mt - area_house_mt;
;

/***** THE TIME REQUIRED TO CUT THE GRASS IN SECONDS *****/
total_time = (int) area_grass_ft / RATE ;

```

```

        /***** THE NUMBER OF HOURS REQUIRED TO CUT THE GRASS IN SECONDS
*****/
        hours=total_time / 3600;

        /*****PRINT THE DESIRED OUTPUT*****/
        printf("\n");
        print("\n");
        print("The time required to cut the grass in the yard is: ");
        print("%d hours %d minutes %d seconds. \n",hours,minutes,seconds);

        print("The area of the yard in square feet is:sq ft.\n", area_yard_ft);
        print("The area of the yard in square meter is: sq. meter.",
area_yard_mt);
        print("The area of the house in square feet is: sq. ft.", area_house_ft);
        print("The area of the house in square meter is: sq. meter.",
area_house_mt);
        print("The area of the grass area in square feet is: sq. ft.",
area_grass_ft);
        print("The area of the grass area in square meter is: sq. meter." ,
area_grass_mt);

        print("\n");
        print("\n");

        print("The perimeter of the yard in feet is: ft.", peri_yard_ft);
        print("The perimeter of the yard in meter is: meter. ", peri_yard_mt);
        print("The perimeter of the house in feet is: ft.", peri_house_ft);
        print("The perimeter of the house in meter is: meter. ", peri_house_mt);
print("\n");
        print("\n");
        print("Thank you for using our property evaluation software !!\n");
        print("Have a great day!\n");

        print("\n");
        print("\n");

}

```

#### Step 5: Coding in C Language

```

#include <stdio.h>
#define RATE 2

int main(void)
{
    /*Declaration of input variables*/
    float length_yard;          /* Length of the rectangular yard */
    float length_house;        /* Length of the rectangular house*/
    float width_yard;          /* Widht of the rectangular yard */
    float width_house;        /* Width of the rectangular house */
    const float fttometer = 0.3048; /* 1 ft = 0.3048 meter */
}

```

```

/*Declaration of output variables*/
int hours;          /*Number of hours required to cut the grass */
int minutes;       /*Number of minutes required to cut the grass*/
int seconds;       /*Number of seconds required to cut the grass*/

float area_yard_ft;      /*Area of the yard in ft */
float area_yard_mt;     /*Area of the yard in meter */
float area_house_ft;    /*Area of the house in ft */
float area_house_mt;    /*Area of the house in meter */
float area_grass_ft;    /*Area of the grass in ft */
float area_grass_mt;    /*Area of the grass in meter */

float peri_yard_ft;     /*perim of the yard in ft */
float peri_yard_mt;     /*perim of the yard in meter */
float peri_house_ft;    /*perim of the house in ft */
float peri_house_mt;    /*perim of the house in meter */

/*Declaration of intermediate variables*/
int total_time;        /*Total time in seconds, to cut the grass*/

/*****SEQUENCE OF STEPS *****/
/*Sequence of Steps*/

/* Get the length of the yard*/
printf("\n\nWhat is the length of the rectangular yard?\t\t:");
scanf("%f",&length_yard);

/* Get the width of the yard*/
printf("What is the width of the rectangular yard?\t\t:");
scanf("%f",&width_yard);

/* Get the length of the house*/
printf("Please scan in the length of the rectangular house\t:");
scanf("%f",&length_house);

/* Get the width of the house*/
printf("Please scan in the width of the rectangular house\t:");
scanf("%f",&width_house);

/***** COMPUTE THE AREA and perimeter OF THE YARD *****/
area_yard_ft = length_yard * width_yard;
area_yard_mt = (length_yard * fttometer) * (width_yard * fttometer);
peri_yard_ft = 2 * (length_yard + width_yard);
peri_yard_mt = 2 * ((length_yard * fttometer) + (width_yard * fttometer));

/***** COMPUTE THE AREA and perimeter OF THE HOUSE *****/
area_house_ft = length_house * width_house;
area_house_mt = (length_house * fttometer) * (width_house * fttometer);
peri_house_ft = 2 * (length_house + width_house);
peri_house_mt = 2 * ((length_house * fttometer) + (width_house *
fttometer));

/***** COMPUTE THE AREA OF THE GRASS *****/
area_grass_ft = area_yard_ft - area_house_ft;

```



```

    area_grass_mt = (area_yard_ft * fttometer) - (area_house_ft * fttometer);

    /***** THE TIME REQUIRED TO CUT THE GRASS IN SECONDS *****/
    total_time = (int) area_grass_ft / RATE ;

/***** THE NUMBER OF HOURS REQUIRED TO CUT THE GRASS IN SECONDS *****/
    hours=total_time / 3600;

/***** THE NUMBER OF MINUTES REQUIRED TO CUT THE GRASS IN SECONDS *****/
    minutes =(total_time % 3600)/60 ;

/***** THE REMAINED NUMBER OF SECONDS REQUIRED TO CUT THE GRASS IN SECONDS *****/
    seconds=( total_time%3600 ) % 60;

    /*****PRINT THE DESIRED OUTPUT*****/
    printf("\n");
    printf("\n");
    printf("The time required to cut the grass in the yard is: ");
    printf ( "%d hours %d minutes %d seconds. \n",hours,minutes,seconds);

    printf("The area of the yard in square feet is:\t\t %0.2f sq. ft.\n",
area_yard_ft);
    printf("The area of the yard in square meter is:\t %0.2f sq. meter.\n",
area_yard_mt);
    printf("The area of the house in square feet is:\t %0.2f sq. ft.\n",
area_house_ft);
    printf("The area of the house in square meter is:\t %0.2f sq. meter.\n",
area_house_mt);
    printf("The area of the grass area in square feet is:\t %0.2f sq. ft.\n",
area_grass_ft);
    printf("The area of the grass area in square meter is:\t %0.2f sq.
meter.\n" , area_grass_mt);

    printf("\n");
    printf("\n");

    printf("The perimeter of the yard in feet is:\t %0.2f ft. \n",
peri_yard_ft);
    printf("The perimeter of the yard in meter is:\t %0.2f meter. \n",
peri_yard_mt);
    printf("The perimeter of the house in feet is:\t %0.2f ft. \n",
peri_house_ft);
    printf("The perimeter of the house in meter is:\t %0.2f meter. \n",
peri_house_mt);

    printf("\n");
    printf("\n");
    printf("Thank you for using our property evaluation software !!\n");
    printf("Have a great day!\n");

    printf("\n");
    printf("\n");

```

```

return 0;

}

```

Step 6: Testing and Verification (tracing through the program with hand)

Assume we test the program with the following value:

```

What is the length of the rectangular yard?           :200
What is the width of the rectangular yard?           :100
Please scan in the length of the rectangular house    :180
Please scan in the width of the rectangular house     :80

```

At the beginning of the program all variables declared are reserved as indicated in the program: The CPU will execute the sequence of instructions as follows:

a) Memory cells are set for the declared input, intermediate and output variables as follows:

```

/*Declaration of input variables*/
float length_yard;           /* Length of the rectangular yard */
float length_house;         /* Length of the rectangular house*/
float width_yard;           /* Width of the rectangular yard */
float width_house;          /* Width of the rectangular house */
const float fttometer = 0.3048; /* 1 ft = 0.3048 meter */
const int RATE = 2;

/*Declaration of output variables*/
int hours;                  /*Number of hours required to cut the grass */
int minutes;                /*Number of minutes required to cut the grass*/
int seconds;                /*Number of seconds required to cut the grass*/

float area_yard_ft;         /*Area of the yard in ft */
float area_yard_mt;         /*Area of the yard in meter */
float area_house_ft;        /*Area of the house in ft */
float area_house_mt;        /*Area of the house in meter */
float area_grass_ft;        /*Area of the grass in ft */
float area_grass_mt;        /*Area of the grass in meter */

float peri_yard_ft;         /*perim of the yard in ft */
float peri_yard_mt;         /*perim of the yard in meter */
float peri_house_ft;        /*perim of the house in ft */
float peri_house_mt;        /*perim of the house in meter */

/*Declaration of intermediate variables*/
int total_time;             /*Total time in seconds, to cut the grass*/

```

b) Executable instructions scanf have the effect of reading the values we want to input as defined in the beginning of Step 6 reading 200 into the variable length\_yard with scanf("%f",&length\_yard);

Reading 100 into the variable width\_yard with

scanf("%f",&width\_yard);

Reading 180 into the variable length\_house: with scanf("%f",&length\_house);

Reading 80 into the variable width\_house with scanf("%f",&width\_house);

c) The next program instructions are executed as follows:

```

/***** COMPUTE THE AREA and perimeter OF THE YARD *****/
area_yard_ft = length_yard * width_yard; = 200 * 100 = 20000
area_yard_mt = (length_yard * fttometer) * (width_yard * fttometer);
= (200 * 0.3048) * (100 * 0.3048) = 60.96 * 30.48 = 1858.0608
peri_yard_ft = 2 * (length_yard + width_yard);
= 2 * (200 + 100) = 600
peri_yard_mt = 2 * ((length_yard * fttometer) + (width_yard *
fttometer));
= 2 * (60.96 + 30.48) = 182.88

/***** COMPUTE THE AREA and perimeter OF THE HOUSE *****/
area_house_ft = length_house * width_house; = 180 * 80 = 14400
area_house_mt = (length_house * fttometer) * (width_house * fttometer);
= (180 * 0.3048) * (80 * 0.3048) = 54.864 * 24.384 = 1337.8037
peri_house_ft = 2 * (length_house + width_house);
= 2 * (180 + 80) = 520
peri_house_mt = 2 * ((length_house * fttometer) + (width_house *
fttometer));
= 2 * (54.864 + 24.384) = 158.496

/***** COMPUTE THE AREA OF THE GRASS *****/
area_grass_ft = area_yard_ft - area_house_ft;
= 20000 - 14400 = 5600.
area_grass_mt = area_yard_mt - area_house_mt;
= 1858.0608 - 1337.8037 = 520.26.

/***** THE TIME REQUIRED TO CUT THE GRASS IN SECONDS *****/
total_time = (int) area_grass_ft / RATE ;
= 5600/2 = 2800.

/***** THE NUMBER OF HOURS REQUIRED TO CUT THE GRASS IN SECONDS *****/
hours=total_time / 3600;
= 2800/3600 = 0 hours.

/***** THE NUMBER OF MINUTES REQUIRED TO CUT THE GRASS IN SECONDS *****/
minutes =(total_time % 3600)/60 ;
= 2800 / 60 = 46

/***** THE REMAINED NUMBER OF SECONDS REQUIRED TO CUT THE GRASS IN SECONDS
*****/
*/
seconds=( total_time%3600 ) % 60;
= 40 % 60 = 40.

```

e) The desired output will be printed by the following instructions.

```

/*****PRINT THE DESIRED OUTPUT*****/
printf("\n");
printf("\n");
printf("The time required to cut the grass in the yard is: ");
printf ("%d hours %d minutes %d seconds. \n",hours,minutes,seconds);
==> 0 hours 46 minutes 40 seconds.

printf("The area of the yard in square feet is:\t\t %0.2f sq. ft.\n",
area_yard_ft);

```

```

==> The area of the yard in square feet is: 20000 sq. ft.

    printf("The area of the yard in square meter is:\t %0.2f sq. meter.\n",
area_yard_mt);
==> The area of the yard in square meter is:1858.0608 sq. meter.

    printf("The area of the house in square feet is:\t %0.2f sq. ft.\n",
area_house_ft);
==> The area of the house in square feet is: 14400 sq. ft.

    printf("The area of the house in square meter is:\t %0.2f sq. meter.\n",
area_house_mt);

==> The area of the house in square meter is: 1337.8037 sq. meter.
    printf("The area of the grass area in square feet is:\t %0.2f sq. ft.\n",
area_grass_ft);
==> The area of the grass area in square feet is: 5600 sq. ft.

    printf("The area of the grass area in square meter is:\t %0.2f sq.
meter.\n
" , area_grass_mt);
==> The area of the grass area in square meter is: 1706.88 sq. meter.
    printf("\n");
    printf("\n");

    printf("The perimeter of the yard in feet is:\t %0.2f ft. \n",
peri_yard_ft);
==> The perimeter of the yard in feet is: 600 ft.

    printf("The perimeter of the yard in meter is:\t %0.2f meter. \n",
peri_yard_mt);
==> The perimeter of the yard in meter is: 182.88 meter.
    printf("The perimeter of the house in feet is:\t %0.2f ft. \n",
peri_house_ft);
==> The perimeter of the house in feet is: 520 ft.

    printf("The perimeter of the house in meter is:\t %0.2f meter. \n",
peri_house_mt);
==> The perimeter of the house in meter is: 158.496 meter.

    printf("\n");
    printf("\n");
    printf("Thank you for using our property evaluation software !!\n");
    printf("Have a great day!\n");

    printf("\n");
    printf("\n");

```

END

```

cezeife@bravo:~/fall15/assignmt$ cat cezeife_asn2.c
#include <stdio.h>

```

```
#define RATE 2

/* This presents the program for Assignment 2 solution for 60-140 for Fall 2015
which is
described as follows:
Step 1: Requirements Analysis (Problem Definition):
Write a program that reads in the length and width of a rectangular yard in feet,
the
length and width of a rectangular house located in the yard in feet, and
calculates and
displays the time required to cut the grass in the yard at the rate of 2 square
feet per
second (we assume that the part of the yard that is not covered by the house is
covered by
grass and needs to be cut). The computed time has to be given in Hours- Min-
Seconds. Your
program should also print the areas (length * width) of the yard, the house and
the grass
area in both square feet and square meter as well as the perimeters (2 * (length
+ width))
of the yard and the house in both feet and meter. Note that 1 (foot) feet is
equal to 0.3048 meter.
```

```
Program written by Professor Christie Ezeife.
*/
```

```
int main(void)
{
    /*Declaration of input variables*/
    float length_yard;          /* Length of the rectangular yard */
    float length_house;        /* Length of the rectangular house*/
    float width_yard;          /* Widht of the rectangular yard */
    float width_house;        /* Width of the rectangular house */
    const float fttometer = 0.3048; /* 1 ft = 0.3048 meter */

    /*Declaration of output variables*/
    int hours;                /*Number of hours required to cut the grass */
    int minutes;              /*Number of minutes required to cut the grass*/
    int seconds;              /*Number of seconds required to cut the grass*/

    float area_yard_ft;       /*Area of the yard in ft */
    float area_yard_mt;       /*Area of the yard in meter */
    float area_house_ft;     /*Area of the house in ft */
    float area_house_mt;     /*Area of the house in meter */
    float area_grass_ft;     /*Area of the grass in ft */
    float area_grass_mt;     /*Area of the grass in meter */

    float peri_yard_ft;      /*perim of the yard in ft */
    float peri_yard_mt;      /*perim of the yard in meter */
    float peri_house_ft;     /*perim of the house in ft */
    float peri_house_mt;     /*perim of the house in meter */

    /*Declaration of intermediate variables*/
    int total_time;          /*Total time in seconds, to cut the grass*/
```

```

/*****SEQUENCE OF STEPS *****/
/*Sequence of Steps*/

/* Get the length of the yard*/
printf("\n\nWhat is the length of the rectangular yard?\t\t:");
scanf("%f",&length_yard);

/* Get the width of the yard*/
printf("What is the width of the rectangular yard?\t\t:");
scanf("%f",&width_yard);

/* Get the length of the yard*/
printf("Please scan in the length of the rectangular house\t:");
scanf("%f",&length_house);

/* Get the width of the yard*/
printf("Please scan in the width of the rectangular house\t:");
scanf("%f",&width_house);

/***** COMPUTE THE AREA and perimeter OF THE YARD *****/
area_yard_ft = length_yard * width_yard;
area_yard_mt = (length_yard * fttometer) * (width_yard * fttometer);
peri_yard_ft = 2 * (length_yard + width_yard);
peri_yard_mt = 2 * ((length_yard * fttometer) + (width_yard * fttometer));

/***** COMPUTE THE AREA and perimeter OF THE HOUSE *****/
area_house_ft = length_house * width_house;
area_house_mt = (length_house * fttometer) * (width_house * fttometer);
peri_house_ft = 2 * (length_house + width_house);
peri_house_mt = 2 * ((length_house * fttometer) + (width_house *
fttometer));

/***** COMPUTE THE AREA OF THE GRASS *****/
area_grass_ft = area_yard_ft - area_house_ft;
area_grass_mt = area_yard_mt - area_house_mt;
//area_grass_mt = (area_yard_ft * fttometer *fttometer) - (area_house_ft *
fttometer * fttometer);

/***** THE TIME REQUIRED TO CUT THE GRASS IN SECONDS *****/
total_time = (int) area_grass_mt / RATE ;

/***** THE NUMBER OF HOURS REQUIRED TO CUT THE GRASS IN SECONDS *****/
hours=total_time / 3600;

/***** THE NUMBER OF MINUTES REQUIRED TO CUT THE GRASS IN SECONDS *****/
minutes =(total_time % 3600)/60 ;

/***** THE REMAINED NUMBER OF SECONDS REQUIRED TO CUT THE GRASS IN SECONDS
*****/
seconds=( total_time%3600 ) % 60;

/*****PRINT THE DESIRED OUTPUT*****/

```

```

printf("\n");
printf("\n");
printf("The time required to cut the grass in the yard is: ");
printf ("%d hours %d minutes %d seconds. \n",hours,minutes,seconds);

printf("The area of the yard in square feet is:\t\t %0.2f sq. ft.\n",
area_yard_ft);
printf("The area of the yard in square meter is:\t %0.2f sq. meter.\n",
area_yard_mt);
printf("The area of the house in square feet is:\t %0.2f sq. ft.\n",
area_house_ft);
printf("The area of the house in square meter is:\t %0.2f sq. meter.\n",
area_house_mt);
printf("The area of the grass area in square feet is:\t %0.2f sq. ft.\n",
area_grass_ft);
printf("The area of the grass area in square meter is:\t %0.2f sq.
meter.\n" , area_grass_mt);

printf("\n");
printf("\n");

printf("The perimeter of the yard in feet is:\t %0.2f ft. \n",
peri_yard_ft);
printf("The perimeter of the yard in meter is:\t %0.2f meter. \n",
peri_yard_mt);
printf("The perimeter of the house in feet is:\t %0.2f ft. \n",
peri_house_ft);
printf("The perimeter of the house in meter is:\t %0.2f meter. \n",
peri_house_mt);

printf("\n");
printf("\n");
printf("Thank you for using our property evaluation software !!\n");
printf("Have a great day!\n");

printf("\n");
printf("\n");

return 0;

```

```

}
cezeife@bravo:~/fall15/assignmt$ cc cezeife_asn2.c
cezeife@bravo:~/fall15/assignmt$ ./a.out

```

```

What is the length of the rectangular yard?      :200.00
What is the width of the rectangular yard?      :100.00
Please scan in the length of the rectangular house :180.00
Please scan in the width of the rectangular house  :80.00

```

```

The time required to cut the grass in the yard is: 0 hours 46 minutes 40 seconds.
The area of the yard in square feet is:          20000.00 sq. ft.
The area of the yard in square meter is:         1858.06 sq. meter.

```

The area of the house in square feet is: 14400.00 sq. ft.  
The area of the house in square meter is: 1337.80 sq. meter.  
The area of the grass area in square feet is: 5600.00 sq. ft.  
The area of the grass area in square meter is: 520.26 sq. meter.

The perimeter of the yard in feet is: 600.00 ft.  
The perimeter of the yard in meter is: 182.88 meter.  
The perimeter of the house in feet is: 520.00 ft.  
The perimeter of the house in meter is: 158.50 meter.

Thank you for using our property evaluation software !!  
Have a great day!

```
cezeife@bravo:~/fall15/assignmt$ exit  
exit
```

Script done on Mon 07 Sep 2015 08:07:06 PM EDT