Designs 1 (Elementary C Programs)

Graded course work

Important Notes:

- **Write all the programs, from the designs in this handout**
- **Use the same program names, and variable names that I have specified**
- **Compile, run, and test your programs**
- **Submit a copy of these programs to me for grading**
- **If you don't know how to do any particular part, ask me -- I will show you how**

Program (`sub_two.c`)

Based on program `add_two.c`, write a program that asks for two numbers, then subtracts the first from the second.

Use an appropriate output message, such as:

```
Subtracting 3 from 7 results in: 4
```

Program (`div_two.c`)

Based on program `add_two.c`, write a program that asks for two numbers, then divides the first by the second.

Use an appropriate output message, such as:

```
Dividing 8 by 2 results in: 4
```

Program (`mul_two.c`)

Based on program `add_two.c`, write a program that asks for two numbers, then multiplies them.

Use an appropriate output message, such as:

```
Multiplying 5 by 3 results in: 15
```

Program (`area1.c`)

Based on program `mul_two.c`, write a program that asks for the length, and width of a room, then calculates the area of the room for a floor covering. Assume a rectangular room.

---

declare floats "room_width", "room_length", "room_area"

ask for the width of the room

put the number in the box "room_width"

ask for the length of the room

put the number in the box "room_length"

multiply the number in the box "room_width" and the number in the box "room_length"

and put the result in the box "room_area"

tell the number in the box "room_area"

Program output:

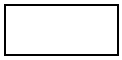
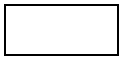
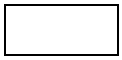
```
Please enter the room width (feet): 10
Please enter the room length (feet): 12

A room with a width of: 10 feet, and length of: 12 feet.
Has an area of: 120 square feet

Press any key to continue_
```

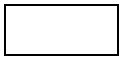
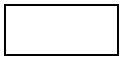
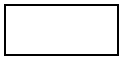
Program (`area2.c`)

Based on program `area1.c`, write a program that asks the user of the width, and height of a wall, and the width, and height of a single window in that wall, and calculates the amount of wallpaper needed to cover the wall.

---

declare floats "wall_width", "wall_height", "wall_area", "window_width", "window_height", "window_area", "wallpaper_area"

ask for the width of the wall
put the number in the box "wall_width" 
ask for the height of the wall
put the number in the box "wall_height" 
multiply the number in the box "wall_width" and the number in the box "wall_height"
and put the result in the box "wall_area" 

ask for the width of the window
put the number in the box "window_width" 
ask for the height of the window
put the number in the box "window_height" 
multiply the number in the box "window_width" and the number in the box "window_height"
and put the result in the box "window_area" 

subtract the number in the box "window_area" from the number in the box "wall_area"
and put the result in the box "wallpaper_area"

tell the number in the box "wallpaper_area"

Program (`convert1.c`)

Write a program that asks for a distance in miles, then converts it to kilometers using the formula:

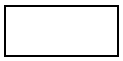
kilometers = miles / kilometers per mile

---

declare floats "miles", "kilometers", and a constant float "kilometers_per_mile" set to 0.6213 (see program gas.c)

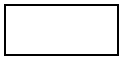
ask for the distance in miles

put the number in the box "miles"



divide the number in the box "miles" by the number in the box "kilometers_per_mile"

and put the result in the box "kilometers"



tell the number in the box "kilometers"

Program (`convert2.c`)

Based on the program `clock.c`, write a program that converts a measurement in inches to feet, and inches.

Program output:

```
Please enter a number of inches: 16

16 inches, converts to:
        1 feet.
        4 inches.

Press any key to continue_
```

```
Please enter a number of inches: 27

27 inches, converts to:
        2 feet.
        3 inches.

Press any key to continue_
```

Use the variable declarations:

```
int input_inches = 0,
    output_feet = 0,
    output_inches = 0;
```

Program (`volume1.c`)

Write a program that tells a contractor how much concrete will be needed to fill a rectangular hole.

The program will ask for the length, width, and depth of a hole (in inches), and calculates the volume of the hole in cubic yards.

---

declare floats "hole_length", "hole_width", "hole_depth", "hole_volume"

ask for hole length
put the number in the box "hole_length" 
ask for hole width
put the number in the box "hole_width" 
ask for hole depth
put the number in the box "hole_depth" 

calculate: ("hole_length" / 36) * ("hole_width" / 36) * ("hole_depth" / 36)
and put result in the box "hole_volume" 

tell the number in the box "hole_volume"

Program output:

```
Please enter the length of the hole (inches): 34
Please enter the width of the hole (inches): 45
Please enter the depth of the hole (inches): 38

The volume of the hole that is:
        34.00 inches long.
        45.00 inches wide.
        38.00 inches deep.
Has a volume of: 1.25 cubic yards.

Press any key to continue_
```

See program `format2.c` for how to format floating point output, and page 3 of lesson 1 for how to tab output.

Program (`circle.c`)

Write a program that asks for the diameter of a circle, it then calculates the area, and circumference of the circle using the formulae:

circumference = pi * diameter
area = pi * radius * radius

The radius of a circle is half the diameter.

---

declare floats "diameter", "radius", "circumference", "area", the constant float "pi" and set it to 3.14

ask for the diameter of the circle

put the number in the box "diameter"

divide the number in the box "diameter" by 2 and put the result in the box "radius"

calculate: "diameter" * "pi" and put the result in the box "circumference"

calculate: "pi" * "radius" * "radius" and put the result in the box "area"

tell the value in the box "circumference"

tell the value in the box "area"

Program (`tiles1.c`)

Write a program that tells a contractor how many tiles are needed to tile the floor of a room. Assume that the tiles are square, and that the room is rectangular.

The program should:

- Ask for the size of the tile in inches
- Ask for the length of the room in inches
- Ask for the width of the room in inches
- Tell how many tiles will be needed for that room

Use the variable declarations:

```
float tile_size = 0,
      tile_area = 0,
      number_of_tiles = 0,
      room_width = 0,
      room_length = 0,
      room_area = 0;
```

Example program output:

```
Please enter the size of the tile (in inches): 8
Please enter the width of the room (in inches): 16
Please enter the length of the room (in inches): 16

To tile a floor, of area: 256.00 inches.
With 8.00 inch tiles.
Will require 4.00 tiles.

Press any key to continue_
```

```
Please enter the size of the tile (in inches): 10
Please enter the width of the room (in inches): 40
Please enter the length of the room (in inches): 60

To tile a floor, of area: 2400.00 inches.
With 10.00 inch tiles.
Will require 24.00 tiles.

Press any key to continue_
```

Sketching these two examples will help you come up with the formula for calculating the number of tiles needed, try it.