(60-140) ASSIGNMENT 1

Due: 11:59pm, Sept. 29, 2017

1. **2.7** (p. 33) Which of the following are keywords in C?

   (a) `for` (b) `If` (c) `main` (d) `printf` (e) `while`

2. **2.10** (p. 34) In the `dweight.c` program (Section 2.4), which spaces are essential?

3. **2.2*** (p. 34) Use the RAPTOR program to design an algorithm with flowchart. The flowchart uses formula $\nu = 4/3\pi r^3$ to compute the volume of a sphere with a 10-meter radius and then, after finishing calculation, prints the result in a one-line output as illustrated below, where `10` has to be filled in by the value of radius and `4188.7902` by the result of calculation.

   ```
   A volume of sphere with 10-meter radius is 4188.7902.
   ```

   (a) Save the flowchart in a file named as `a1_sphere.rap`, and submit the file online.

   (b) Try out the debugging feature of Raptor flowchart by following the steps below, and attach with your online submission a screenshot that includes all necessary details to demonstrate your work.

   i. Start the flowchart after setting a break point before calculating the volume;
   ii. Assign the radius to a new value of 11 when the flowchart stops; and
   iii. Continue the calculation and output of sphere volume.

   Hint: Go through the process once to obtain the new output in the Master Console; while going through the process the second time, screenshot after typing the command when the flow stops at the breakpoint.

4. **2.2** Implement the algorithm to produce a C program that accomplishes what the `a1_sphere.rap` flowchart does. Write the fraction `4/3` as `4.0f/3.0f`. (Try writing it as `4/3`. What happens?) Save the program in a file named as `a1_sphere.c`. Submit `a1_sphere.c` as your solution to this question, and report in the submission box your observation when writing the fraction as `4/3`.

   Hint: Multiply r by itself twice to compute r^3 as C doesn't have an exponentiation operator.

5. **3.1** (p. 49) What output do the following calls of `printf` produce?

   (a) `printf("%6d,%4d", 86, 1040);`
   (b) `printf("%12.5e", 30.253);`
   (c) `printf("%.4f", 83.162);`
   (d) `printf("%-6.2g", .0000009979);`

6. **3.2*** (p. 50) Design an algorithm with flowchart to format the information for a product entered by the user. A session running the flowchart should produce the following in the Master Console, where all columns are left justified. Save the flowchart in a file named as `a1_purchase.rap`, and submit the file as your solution to this question.

   ```
   Enter item number:  583
   Enter unit price:  13.5
   Enter purchase date (mm/dd/yyyy):  10/24/2010
   Item            Unit            Purchase
                   Price           Date
   583             $13.50          10/24/2010
   ```

   Hint: Assign `"" + to_character(9) + to_character(9)` to a variable and then use it as tabs in the output to line up the columns.

7. **3.2** Implement the algorithm to produce a C program that accomplishes what the `a1_purchase.rap` flowchart does, with a minor modification to make the unit price right justified and to allow dollar amount up to $999.99, e.g., $ 13.50 with one space after $. In addition, the month, day, and year must be saved to separated integer variables before being used in print out. Save the program in a file named as `a1_purchase.c`, and submit the file as your solution to this question.