2. PROGRAMMING ASSIGNMENT 2: UPDATED 10/7/17, 10/11/17
Read: Textbook: Chapter 4
Programming: Name your program p2.c
DUE: Saturday, October 14, 2017 @ 6:00am

You will write a program to read a positive integer \( N \) and display the product of the first \( N \) odd integers. If \( N \) is 4, then "1 * 3 * 5 * 7 = 105" is printed.

a) Use type char for "answer" to repeat program, double for variable to hold product, and integers for remaining variables:
   ```c
   int count; // Count number of first odd integers
   int oddNum; // Start at one for "odd integers"
   int num; // Input number
   double product; // Cumulative product of first N odd integers
   ```

b) Use these symbolic constants for readability and good style.
   ```c
   #define MIN 2 // Minimum range
   #define MAX 15 // Maximum range
   #define INIT 1 // Start counters, odd number, product
   #define STEP_FACTOR 2 // Increment to next odd number
   ```

c) Allow the user to enter one positive whole number, "num". The grader will enter ONE integer larger than 1 (no alphabetical characters). Allow input less than or equal to the maximum value of 15 using a loop. The product may be a huge number, use "%.0lf" in your printf(), displaying no decimals.

d) Use the while loop to generate this calculation. See sample output below.

e) Repeat this calculation using a for loop

f) Repeat this calculation using a do loop

g) Therefore your program will generate three identical calculations of this product of first \( N \) odd integers for ONE number input by using while loop for the 1\(^{st}\) calculation, for loop for the 2\(^{nd}\) calculation, and the do loop for the 3\(^{rd}\) calculation.
   - Remember to reinitialize the starting "count" to one before each loop (while, for, do). Do other variables need to be reinitialized also?
   - Do NOT use "goto" in CSE 5a.

h) Leading zeros are ignored on input. Do not use functions, if-else, switch statements or any other construct we have not yet covered in lecture. Use only loop constructs of while, for, and do.

i) Comments are a very important part of your program. They tell the programmer what is being done and how it's being done. How do you know that your program is producing correct output? printf() in the program is very helpful to the user. printf() makes it easier to interact with your program making it user friendly.

j) Allow your program to repeat this calculation as often as the user wishes when the user types in a single character of ONLY a 'y' (lowercase y). Use the following code to handle character input and program repetition.

```c
printf("Enter a number … calculate the product ",...);
scanf("%d", &num); // Read integer input
getchar(); // Read <ENTER> key
/* ... */
printf("Want to calculate the product of first N odd integers? ");
answer = getchar(); // Assign to character
}while (answer == 'y' ); // Loop while a 'y' is input
```
Submit your program for grading as in Programming Assignment One (PA#1), only with a different number of "2".

**HINTS:**

a) Write code for user input, step a) b), c), and j). Write code for test maximum input later.

b) Modify **while** loop code step d) as given in lecture. Compile. Run. Test.

c) Write **for** loop code, step e). Test.

d) Write **do** loop code, step f) and g).

e) Write code step j) to repeat calculations. Write code to test input for upper bound maximum limit using an inner loop.

f) Remember, the program will run calculations for an input minimum value of two. Use ONLY loop constructs and NO if-else or switch constructs, step g) and h).

g) Write comments, step i). Done!

Know the difference between integers and floating points. Which can store the larger (or smaller) number?

**Save the final version of your program as “p2.c”**

**PA#2 SAMPLE OUTPUT:** (input shown in **bold** type)

```
Enter a number (2-15) to calculate the product of first N odd integers: 4
Using while loop: 1 * 3 * 5 * 7 = 105
Using for loop: 1 * 3 * 5 * 7 = 105
Using do loop: 1 * 3 * 5 * 7 = 105

Want to calculate the product of first N odd integers? y

Enter a number (2-15) to calculate the product of first N odd integers: 15
Using while loop: 1 * 3 * 5 * 7 * 9 * 11 * 13 * 15 * 17 * 19 * 21 * 23 * 25 * 27 * 29 =
619028353629375
Using for loop: 1 * 3 * 5 * 7 * 9 * 11 * 13 * 15 * 17 * 19 * 21 * 23 * 25 * 27 * 29 =
619028353629375
Using do loop: 1 * 3 * 5 * 7 * 9 * 11 * 13 * 15 * 17 * 19 * 21 * 23 * 25 * 27 * 29 =
619028353629375

Want to calculate the product of first N odd integers? y

Enter a number (2-15) to calculate the product of first N odd integers: 222

Enter a number (2-15) to calculate the product of first N odd integers: 3
Using while loop: 1 * 3 * 5 = 15
Using for loop: 1 * 3 * 5 = 15
Using do loop: 1 * 3 * 5 = 15

Want to calculate the product of first N odd integers? n
```

Note:
If you must interrupt your program (an infinite loop), type: `<CTRL>C` (^C)

**Verify you SAVED your work in the Documents - cs5f HOME directory.**