

# CS 1313 010 Fall 2007 Homework #9

Quiz to be held in class 10:30-10:45am Mon Oct 22 2007

1. DESCRIBE THE CONDITION of a `while` loop. (“The condition is a …”)
  
2. Are the PROPERTIES of the condition of a `while` loop the same as, or different from, the condition of an `if` block?
  
3. WHAT ARE THE STEPS that describe the execution of a `while` loop?
  - (a)
  
  - (b)
  
  - (c)
    - i.
  
    - ii.
  
4. HOW does a `while` loop DIFFER from an `if` block?

5. For each of these kinds of statements, mark **CAN** if it can appear in the body of a `while` loop, and mark **CANNOT** if it cannot appear in the body of a `while` loop. **EXPLAIN.**

(a) A named constant declaration

(b) A variable declaration

(c) A `print` statement

(d) A `scanf` statement

(e) An assignment statement

(f) A `exit` statement

(g) An `if` block

(h) A `while` loop

6. What is the **OUTPUT** of each of these programs? If you aren't confident of an answer, type in, compile and run the program to test it.

- (a) 

```
#include <stdio.h>
int main ()
{ /* main */
    int count;
    int sum = 0;

    for (count = 1; count <= 10; count++) {
        sum = sum + count;
    } /* for count */
    printf("sum = %d\n", sum);
    return 0;
} /* main */
```
- (b) 

```
#include <stdio.h>
int main ()
{ /* main */
    int count;
    int sum = 0;

    for (count = 1; count <= 10; count += 2) {
        sum = sum + count;
    } /* for count */
    printf("sum = %d\n", sum);
    return 0;
} /* main */
```
- (c) 

```
#include <stdio.h>
int main ()
{ /* main */
    int count;
    int product = 1;

    for (count = 1; count <= 15; count += 5) {
        product = product * count;
    } /* for count */
    printf("product = %d\n", product);
    return 0;
} /* main */
```

```
(d) #include <stdio.h>
int main ()
{ /* main */
    int count;
    int product = 1;

    for (count = 1; count <= 16; count += 5) {
        product = product * count;
    } /* for count */
    printf("product = %d\n", product);
    return 0;
} /* main */
```

```
(e) #include <stdio.h>
int main ()
{ /* main */
    const int lower_bound = 1;
    const int upper_bound = 17;
    const int stride = 5;
    int count;
    int product = 1;

    for (count = lower_bound;
        count <= upper_bound; count += stride) {
        product = product * count;
    } /* for count */
    printf("product = %d\n", product);
    return 0;
} /* main */
```

7. **DRAW A FLOWCHART** for the Infinite Loop program on slide 13 of the lecture slide packet titled “while Loop Lesson.”

8. **TRACE** the example program on pages 21 through 23 of the lecture packet titled “while Loop Lesson,” using the input values shown on page 24 through 25. Your trace should show the following variables: `your_number`, `your_distance`, `your_last_distance`, `correct_number_hasnt_been_input`.

9. What are the **FIVE STEPS** that describe the execution of a `for` loop?

(a)

(b)

(c)

(d)

(e)

10. Convert the following while loop into a for loop.

```
count = initial_value;
while (count <= final_value) {
    printf("count = %d\n", count);
    count += stride;
} /* while (count <= final_value) */
```

11. Convert the following for loop into a while loop.

```
for(count = 1; count <= n; count++) {
    n_factorial *= count;
} /* for count */
```

12. The combination of  $n$  items taken  $r$  at a time, denoted  ${}_nC_r$  and pronounced “ $n$  choose  $r$ ,” is the number of ways in which you can choose a subset of  $r$  items from a set of  $n$  items:

$${}_nC_r = \frac{n \cdot (n-1) \cdot (n-2) \cdot \dots \cdot (n-r+1)}{1 \cdot 2 \cdot 3 \cdot \dots \cdot r}$$

For example, if you have a standard 52 card poker deck (assuming no jokers and nothing wild), the number of possible 5 card poker hands is “52 choose 5:”

$${}_{52}C_5 = \frac{52 \cdot 51 \cdot 50 \cdot 49 \cdot 48}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} = \frac{311,875,200}{120} = 2,598,960$$

Write a C program that takes as its input  $n$ , the total number of items available (e.g., 52 cards in a deck), and  $r$ , the size of the subgroup to be created (e.g., 5 cards in a poker hand), and outputs  ${}_nC_r$ . (For this homework question, you do not need to include comments if you don't want, and you may use numeric literal constants in the body of the program.)

If you use ANY resources other than Dr. Neeman, Mr. Jones, Mr. Phillips, the course textbook or the materials posted on the course webpage, you MUST reference them on the quiz. **THIS INCLUDES YOUR CLASSMATES, FRIENDS, PROFESSORS, ETC.**