Homework 12
Recursion

TRUE/FALSE

1. A recursive function must have some way to control the number of times it repeats.

   ANS:

2. In many cases it is easier to see how to solve a problem with recursion than with a loop.

   ANS:

3. If a recursive solution is evident for a particular problem, and if the recursive algorithm does not slow system performance by an intolerable amount, then recursion would probably be a good design choice.

   ANS:

4. A base case is not necessary for all recursive algorithms.

   ANS:

5. There must be only one function involved in any recursive solution.

   ANS:

6. Each time a function is called in a recursive solution, the system incurs overhead that is not incurred with a loop.

   ANS:

7. When, in a recursive solution, function A calls function B which, in turn, calls function A, this is known as indirect recursion.

   ANS:

8. A problem can normally be solved with recursion if it can be broken down into smaller problems that are identical in structure to the overall problem.

   ANS:

9. Recursive algorithms are always more concise and efficient than iterative algorithms.

   ANS:

10. Recursion is sometimes required to solve certain types of problems.

ANS:

MULTIPLE CHOICE

1. In a recursive solution, if the problem cannot be solved now, then a recursive function reduces it to a smaller but similar problem and

   a. exits
   b. returns to the main function
   c. returns to the calling function
   d. calls itself to solve the smaller problem

   ANS:

2. What is the first step to take in order to apply a recursive approach?

   a. Identify at least one case in which the problem can be solved without recursion.
   b. Determine a way to solve the problem in all circumstances using recursion.
   c. Identify a way to stop the recursion.
   d. Determine a way to return to the main function.

   ANS:

3. What is the second step to take in order to apply a recursive approach?

   a. Identify at least one case in which the problem can be solved without recursion.
   b. Determine a way to use recursion to solve the problem in all circumstances which cannot be solved without recursion.
   c. Determine a way to return to the main function.
   d. Identify a way to stop the recursion.

   ANS:

4. If, in a recursive solution, function A calls function B which calls function C, this is called _____ recursion.

   a. continuous
   b. direct
   c. three function call
   d. indirect

   ANS:

5. A problem can be solved with recursion if it can be broken down into _____ problems.

   a. smaller
   b. one-line
   c. manageable
   d. modular

   ANS:

6. The base case is the case in which the problem can be solved without

   a. loops
   b. decisions
   c. objects
   d. recursion

ANS:

7. If a problem can be solved immediately without recursion, then the recursive function

   a. solves it and returns
   b. exits
   c. returns a default value
   d. generates a run-time error

   ANS:

8. The process of calling a function requires

   a. a slow memory access
   b. a quick memory access
   c. several actions to be performed by the computer
   d. one action to be performed by the computer

   ANS:

9. Which of the following describes the base case in a recursive solution?

   a. a case in which the problem can be solved without recursion
   b. the case in which the problem is solved through recursion
   c. the way to stop the recursion
   d. the way to return to the main function

   ANS:

10. Recursion is

    a. never required to solve a problem
    b. required to solve certain mathematical problems
    c. sometimes required to solve string problems
    d. required to solve some problems

    ANS:

11. A function is called from the main function for the first time and then calls itself seven times. What is the depth of recursion?

    a. 8
    b. 2
    c. 1
    d. 7

    ANS:

12. What defines the depth of recursion?

    a. the length of the algorithm
    b. the number of function calls
    c. the number of times the function calls itself
    d. the number of times the function goes to the base case

    ANS:

13. Recursive functions are _____ iterative algorithms.

a. more efficient than
b. less efficient than
c. as efficient as
d. impossible to compare to

ANS:

14. A recursive function includes _____ which are not necessary in a loop structure.

a. function calls
b. conditional clauses
c. overhead actions
d. object instances

ANS:

15. Which would be the base case in a recursive solution to the problem of finding the factorial of a number. Recall that the factorial of a non-negative whole number is defined as *n!* where:

If n = 0, then n! = 1
If n > 0, then n! = 1 x 2 x 3 x ... x n

a. *n = 0*
b. *n = 1*
c. *n > 0*
d. The factorial of a number cannot be solved with recursion.

ANS:

COMPLETION

1. All the cases of a recursive solution other than the base case are called the _____ case.

ANS:

2. The base case does not require _____, so it stops the chain of recursive calls.

ANS:

3. Recursive function calls are _____ efficient than loops.

ANS:

4. Each time a function is called, the system incurs _____ that is not necessary with a loop.

ANS:

5. A solution using a(n) _____ is usually more evident than a recursive solution.

ANS:

6. A function is called from the main function and then it calls itself five times. The depth of recursion is _____.

ANS:

7. The majority of repetitive programming tasks are best done with _____.

   ANS:

8. A recursion in which a function directly calls itself is known as _____ recursion.

   ANS:

9. Usually a problem solved by recursion is reduced by making the value of one or more parameters _____ with each recursive call.

   ANS:

10. Some problems are more _____ solved with recursion than with a loop.

    ANS: