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| Instructor |  | Due Date |  |

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| **Part** | **1** | **2** | **3** | **4** | **Total** |
| *Maximum Points* | **25** points | **25** points | **25** points | **25** points | **100**G101010 pointsG |
| ***Your Score*** |  |  |  |  |  |

**Textbook Reading Assignment**

Thoroughly read Chapter(s) on Recursive Functions in your **Python** textbook.

**Part 1 Glossary Terms - Recursion**

Define, in detail, each of these glossary terms from the realm of computer programming logic and design and computer topics, in general. If applicable, use examples to support your definitions. Consult your notes or course textbook(s) as references or the Internet by visiting Web sites such as:

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| --- | --- | --- |
| http://www.askjeeves.com | http://www.webopedia.com | http://www.bing.com |

**(a) base case**

|  |
| --- |
| The case in which the problem would solve without recursion |

**(b) depth of recursion**

|  |
| --- |
| How many times the recursive function calls itself |

**(c) direct recursion**

|  |
| --- |
| The recursive function calls itself without any intermediate functions, e.g., Function A calls function A |

**(d) iterative process**

|  |
| --- |
| A process by which a larger problem is broken down into smaller problems |

**(e) recursive function**

|  |
| --- |
| Any function that calls itself is a recursive function |

**Part 2 Textbook Exercises - Recursion**

For each of the following, select the correct answer.

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

**(a) True** (b) False

**(2)** In many cases a solution using recursion is more evident than a solution using a loop.

(a) True **(b) False**

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

**(a) True** (b) False

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

(a) True **(b) False**

**(5)** There can be several functions involved in the recursion.

**(a) True** (b) False

**(6)** Each time a function is called, the system incurs overhead that is not necessary with a loop.

**(a) True** (b) False

**(7)** When function A calls function B, which in turn calls function A, it is known as indirect recursion.

**(a) True** (b) False

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

**(a) True** (b) False

**(9)** Recursive algorithms are more concise and efficient than iterative algorithms.

(a) True **(b) False**

**(10)** Recursion is required to solve some type of problems.

(a) True **(b) False**

**Part 3 Textbook Exercises - Recursion**

**Mix and Match**

Match each glossary term on the left with its appropriate description on the right.

**d (1)** overhead (a) All the cases of the recursive solution other than the base case are called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ case.

**i (2)** smaller (b) The base case does not require \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ , so it stops the chain of recursive calls.

**h (3)** direct (c) Recursive function calls are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ efficient than loops.

**g (4)** loops (d) Each time a function is called, the system incurs \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is not necessary with a loop.

**c (5)** less (e) A solution using a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is usually more evident than a recursive solution.

**j (6)** more easily (f) A function is called from the main function and then it calls itself five times. The depth of recursion is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**a** **(7)** recursive (g) The majority of repetitive programming tasks are best done with \_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**e (8)** loop (h) A recursion in which a function directly calls itself is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ recursion.

**f (9)** five (i) Usually, a problem is reduced by making the value of one or more parameters \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with each recursive call.

**b (10)** recursion (j) Some problems are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ solved with recursion than with a loop.

**Part 4 Textbook Exercises - Recursion**

**(1)** 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**

**(2)** What is the first step that needs to be taken 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 other circumstances using recursion.

c. Identify a way to stop the recursion.

d. Determine a way to return to the main function.

**(3)** What is the second step that needs to be taken 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 in order to solve the problem in all circumstances which cannot be solved without recursion.**

c. Identify a way to stop the recursion.

d. Determine a way to return to the main function.

**(4)** Function A calls function B, which calls function C, which calls function A. This is called \_\_\_\_\_ recursion.

a. continuous

b. direct

c. three function call

**d. indirect**

**(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

**(6)** The base case is a case in which the problem can be solved without \_\_\_\_\_.

a. loops

b. if

c. objects

**d. recursion**

**(7)** What is referred to as the recursive case?

a. At least one case in which the problem can be solved without recursion **b. A way to solve the problem in all other circumstances using recursion**

c. The way to stop the recursion

d. The way to return to the main function

**(8)** What is referred to as the base case?

**a. At least one case in which the problem can be solved without recursion**

b. The circumstances to solve the problem using recursion

c. The way to stop the recursion

d. The way to return to the main function

**(9)** If the problem can be solved immediately without recursion, then the recursive function \_\_\_\_\_ .

**a. solves it and returns**

b. Exits

c. returns the result

d. generates a run - time error

**(10)** The process of calling a function requires \_\_\_\_\_ .

a. a long 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