iGCSE Computer Science – Unit 1 Review

English Name: ____________________

Unit 1 Review: Short Answer Questions

Answer the following in full sentences. Marks will be given for proper grammar.

1. Explain the phrase "*divide and conquer*". **(3 marks)**

The phrase "divide and conquer" refers to an algorithm strategy where:

– the problem is divided into smaller problems,

– the smaller problems are solved,

– and those solutions are recombined into the final solution.

2. Explain the term *recursion*, and give an example of where recursion can be used. **(2 marks)**

Recursion is when a process calls itself to solve a smaller version of the problem.

Factorial can be defined recursively:

F(n) = n * F(n-1); F(0) = 1   (could be written as: n! = n * (n-1)! ;   0! = 1

Other examples are possible, for example the fibonacci can be defined recursively:

..F(n)=F(n-1)+F(n-2); F(1) = 1, F(0) = 1

3. Although *binary search* is much faster than *linear search* in many situations, it is still extremely common for programmers to use the *linear search* algorithm. Explain situations where *linear search* will be more preferable to a *binary search*? **(2 marks)**

Binary search only works with a sorted list. It is very costly to sort a list. Therefore, if a list is unsorted, linear search is usually preferable.

Another situation where linear search is more preferable is when the list is short. Binary search can be much faster when the list is long, but the benefit is less as the list is shorter. Since binary search is a more complicated algorithm to write, linear search may be Preferable.

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4. Explain the *merge sort* algorithm. **(3 marks)**

The merge sort algorithm first divides the list into shorter lists. It then recursively sorts the shorter lists. Finally, it merges the sorted lists into the final sorted list.

5. Explain the *bubble sort* algorithm. **(2 marks)**

Bubble sort starts at one end of the list and traverses the list, swapping elements if they are out of order. It then repeats this process until the list is sorted.

6. Explain the advantages and disadvantages of the *merge sort* over the *bubble sort* algorithm. **(2 marks)**

The advantage of merge sort over bubble sort is that merge sort is faster than bubble sort. The disadvantage of merge sort when compared to bubble sort is that merge sort is more complicated.

7. Explain why *ambiguous* instructions can cause problems. **(2 marks)**

Ambiguous instructions can cause problems because (1) the instructions may be interpreted differently, resulting in inconsistent results, and (2) not all circumstances may be taken into account.

8. What is a *condition*? Give an example of how a condition can be used. **(2 marks)**

A *condition* is an expression that evaluates to either `true` or `false`. In programming, conditions are used in `if` statements and loops, such as `while`, `repeat`, and `for` loops. In flowcharts, *conditions* are represented in decision blocks. In algorithms they are used in *selection constructs* and *iteration constructs*.