In a collection of 80 coins, 1 coin is counterfeit and weighs 0.1 ounce more than the genuine coins. The genuine coins all weigh a known amount (say 1.0 ounce).

What is the minimum number of weighings needed to identify the fake coin if you use a balance scale (a scale that you can weigh two sets of objects at the same time)? _____

What is the minimum number of weighings needed to identify the fake coin if you use a very sensitive bathroom scale (a scale that you can weigh only one set of objects at a time)? _____

Which sorting algorithm is generally better to use when all of the data can be held in main memory at the same time? _____

   A) Merge sort       B) Quicksort

NP is defined to be _____

A) the collection of all problems such that if you can solve one of these problems in polynomial time, then all problems can be solved in polynomial time.

B) the collection of all problems that are as hard if not harder than the hardest problem in NP.

C) the collection of all problems that can be solved with an algorithm whose complexity is, at most, near polynomial (hence NP).

D) the collection of all problems whose solutions can be checked, but not necessarily solved, in polynomial time.

Induction is natural to use to prove correctness of ________________ algorithms while loop invariants can be used to prove correctness of ________________ algorithms.

What is the recursive part of the recurrence relation for the Towers of Hanoi algorithm?

T(n) = ___________________________

What is the big-Oh run time complexity of the Towers of Hanoi problem? ________________

A recurrence relation in the form T(n) = T(n-1) + O(n) has big-Oh time complexity of ________________
Given the initial order of ints in an array as: 6, 5, 7, 9, 1, 2 what is the order of the elements after 3 iterations of the selection sort algorithm covered in class and one of the HW exercises? ____ ____ ____ ____ ____ ____

What is the big-Oh run time complexity of the selection sort? ________________

"Software is getting slower more rapidly than hardware becomes faster." is known as? ________________

Which is more powerful: a finite state automaton/regular expression or a context-free grammar?

______________________________

Of the finite state automata below where:
v₀ is the start node. w is a terminal node. A node labeled with both v₀ and w is both a start and terminal node.

A) 

B) 

C) 

D) 

E) None of the above

Which finite state automaton correctly recognizes words of the language \(a(ba)^n\) for \(n \geq 0\)? ____

Which finite state automaton correctly recognizes words of the language \((ab)^n\) for \(n \geq 0\)? ____

Which finite state automaton correctly recognizes words of the language \(a(b)^na\) for \(n \geq 0\)? ____

Which finite state automaton above recognizes the same language as the FSA below? ____