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Computer Algorithms HW6

1. In which of the three general categories discussed in Section 9.3 does the problem of computing the nth Fibonacci term belong? Justify your answer.

**The problem of computing the nth Fibonacci term belongs to the first category (Problems for Which Polynomial-Time Algorithms Have Been Found). Finding the nth Fibonacci term has an algorithm that is exponential, but there also exists in algorithm that is polynomial time, the iterative algorithm. Therefore, it belongs to the first category.**

1. List at least two problems that belong in each of the three general categories discussed in Section 9.3.

**Problems for Which Polynomial-Time Algorithms Have Been Found:**

1. **Finding nth Fibonacci Term – Seems too easy from the first question.**
2. **Merge Sort: θ(n lg(n))**
3. **Binary Search: O(lg(n))**

**Problems That Have Been Proven to Be Intractable:**

1. **The Hamiltonian Circuits problem (for all solutions): This was mentioned in the textbook as intractable due to the output requested. The output would need to contain all solutions which would be factorial (n – 1)!**
2. **The Halting Problem: Alan Turing proved this problem to be “Undecidable” because it can be proven that an algorithm to solve this problem cannot exist.**

**Problems That Have Not Been Proven to Be Intractable but for Which Polynomial-Time Algorithms Have Never Been Found:**

1. **The Traveling Salesperson (probably the most famous of NP problems)**
2. **The Sum-of-Subsets problem**
3. **The m-Coloring problem**