

# A Hard Problem in Plain Sight

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Once, I was asked to find the maximum score for a branching, multiple choice quiz. Honestly, it was a totally mundane ask in my opinion, given that scoring out of a maximum score is a totally reasonable thing to choose to do. In a previous meeting, I mentioned that it wasn't so obvious to me how to implement it, but a coworker had suggested it was trivial and I had bowed my head in shame.

There were two types of nodes, question nodes where you'd answer a question and get points based off of your answer, and branch nodes which would take you to a different next question based on a previous answer to a question. The optimization problem I was asked to solve was: what is the maximum score you can possibly get by answering the questions in different ways?

I leave to the reader a challenge: prove that this problem is NP-hard by reducing k-satisfiability to it. This is what I did, and I originally wanted to write the reduction here but then I realized that it will provide a much more satisfying form of fun to the reader to be left to it. One hint I'll provide (among many, if you email me) is that question nodes can have only one answer.