Complexity

Question 1: To the best of our knowledge a decision problem is in NP if and only if its answer takes . . .

A ...non-polynomial time to check.

B ...non-polynomial time to compute.

C ...polynomial time to check.

D ...polynomial time to compute.

E ...possibly forever to compute.

Question 2: To the best of our knowledge a decision problem is NP-hard if and only if . . .

A ...it can be reduced in polynomial time to every problem in NP.

B ...it can be reduced in polynomial time to every NP-complete problem.

C ...every problem in P can be reduced in polynomial time to it.

D ...every problem in NP can be reduced in polynomial time to it.

E ...every NP-complete problem can be reduced in polynomial time to it.

Question 3: If the best known solution checker for a decision problem D takes $\mathcal{O}(n^{k^2})$ time on an instance of size n, for a constant $k > 0$, then what is the ***tightest*** complexity class of D, according to current knowledge?

A P

B NP

C NP-complete

D NP-hard

E we do
not know

Question 4: Given an algorithm that is implemented using dynamic programming which of the following statements best describes the complexity of the implementation.

A Always polynomial time

B Always NP-complete

C Always pseudo polynomial

D $\mathcal{O}(n^2)$

E we do not have enough information