Logan Zweifel

CS:3330

11/14/2021

HW 13 – Intractability

1) In a graph, the number of vertices and possible number of edges have a relationship. The maximum number of edges a vertex can have on a graph is n-1 edges where n is the number of vertices. Using this relationship, the maximum possible sum of all edges is:

   $$(n-1) + (n-2) + \ldots + 1 = n(n-1)/2$$

   This summation shows that the number of vertices, n, and the maximum possible number of edges, n(n-1)/2, can both be bounded from above via a polynomial and thus shows that they are polynomially equivalent.

2) The correct answer is option c. For this specific problem, the given solution is not a poly-time algorithm, but the problem does not state that it has been proven that it is impossible for this problem to have a poly-time solution. Therefore, with the given information it is impossible to tell whether it is tractable or intractable.

3) Yes, depending on choice of encoding scheme an algorithm could run in poly-time for one and exponential-time for the other. For example, the difference in the encoding procedure between binary and unary could have this effect as they are drastically different from each other.