Discrete Optimization

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1   The Assignment Problem

Lecture-3 preparation.

The purpose of this pre-class assignment is to test approaches to solving the assignment problem.

Bring to class your findings.

1. Will greedy assignments find an optimal solution to the assignment problem?

   Consider various greedy selections.

2. A *switch* is good if switching the assignments between two companies results in a lower cost.

   If the current assignment has no good switches, is it optimal?

3. In the "simple solution" proposed in lecture 2 check if it can be improved by switchings.

2   Reductions

The Hanoi Software alliance offers a program to find roots of cubic equations.

The first program will return one root of $ax^3 + bx^2 + cx + d = 0$, a general polynomial of degree 3.

Its cost is $20,000,000$ VND.

Your friend Hoan suggested to sell you a simpler version of this program. It will only find a root of polynomials of the form $ax^3 + bx + c = 0$. Its cost is only $100,000$ VND.

Which program will you buy?

If you need to find all roots of the polynomial $3x^3 + 8x^2 - 44x + 21 = 0$ what will you do if you bought the cheap program?