Homework 06: Heuristics

Due Date: Friday, Mar. 16, 2018, 23:59

30 Points

Problem 1: [10 points] You have 24 coins that look alike. With the exception of one counterfeit, they are all made of gold and weigh exactly the same. The "bad" coin is either heavier or lighter than the others, you do not know which. You also have available an old-fashioned balance scale.

In the worst case, what is the minimum number of weighings you must make in order to locate the bad coin? Explain your reasoning and answer.

Problem 2: [10 points] You are given 10 stacks of what should be 10 gold pieces each. Each gold piece weighs two ounces. Unfortunately, one stack contains 10 counterfeits, each coin weighing only one ounce. You have a kitchen-type scale that reads out the weight of what is put on it.

The problem: determine the counterfeit stack with a single weighing. Explain your reasoning and answer.

Problem 3: [10 points] You have a chain with 21 links. You can break a link in the chain to make smaller chains, but if you do, the broken link becomes worthless. What cuts should you make in the chain to get the largest possible value of n such that you are able to create chains that sum up to each value from 1 through n? For example, if you end up with chains of length 1 and 2, then you can generate the lengths 1, 2, and 3. Explain your reasoning that led to your solution.

Your submission for this homework assignment must be made to Canvas.

This homework must be done individually.

Legibility counts.

All assignments must include the following pledge:

> *"I have not received unauthorized aid on this assignment. I understand the answers that I have submitted. The answers submitted have not been directly copied from another source, but instead are written in my own words."*