

# CS118 Lab

## Problem Solving

Create a team of two or three people (be sure to introduce yourselves for the affirmation) to consider this problem:

### Determine what total currency value resides in your pocket.

We are in state **A**: we don't know how much money is in the pocket.

Our goal is to have a *solution* that will put us in state **B**: where we *do* know how much money is in the pocket.

But we don't just want "the answer" for this pocket – we want a technique (a *solution*) that will compute the value of currency in *any* pocket.

#### Analogy

Your calculator has a square root button. Suppose it could only compute the square root of one value: 37. Of course it wouldn't be much use. Instead, it has a built-in *solution* that will allow it to compute the square root of any (real) number. (And perhaps even complex numbers, depending on your calculator.)

Assume that the user of your solution has only one pocket and that all contents of that pocket are accessible and identifiable as either being currency or *not* being currency. In an English word processing document provide a solution that is **as fundamental as you can make**.

#### Some assumptions we will automatically assume

- The user of the solution has the ability to identify if an item is currency.  
However, to make the solution fundamental, it must make use of that ability in an individual step.
- The user of the solution has the ability to determine the value of a piece of currency.  
However, to make the solution fundamental, it must make use of that ability in an individual step.

#### Some assumptions you cannot make

- There is no currency, or only currency, in the pocket.  
Although either is a possibility, you may not assume that one is actually the case.
- The number or types of items in the pocket

#### Some assumptions which are permitted (although you may choose to *not* make these, which will give a different solution)

- The only type of currency present is American currency (or you could use another country's)
- There are no "aggregators" – e.g. wallets, coin purses

Things to consider:

- How do you access the pocket? One item at a time, or remove all contents and separate them?
  - It is not very fundamental to have a step that says "Add up all the currency". Think about how humans break down that step.
- How do you (as a human) handle non-currency? Express that in your solution.
- How do you (as a human) make sure you don't re-count an item? Express that in your solution.
- What if the pocket is empty?
- What if the pocket contains no currency?

Create a solution in a **Notepad** or **TextEdit** file and provide your answer to the question in the box in the file after your solution. Each team member must submit his/her own copy/version of the solution (you are not required to agree with your team). Be sure to include an affirmation with credit to all involved, including students not on your team who may have provided assistance (even unwittingly).

Submit the document (finished or not) by the end of class. If it is not complete, finish it by 11:59pm that day and submit it again.

#### Question

What are the fundamental tools you are using in your solution?

You are creating a solution for determining the value of currency. What if you wanted to do something similar, such as 'How many metallic objects are in the pocket?' These are similar goals so the solutions will be similar. It's not unreasonable to believe there are fundamental tools used by both solutions.

For example, you might say that a fundamental tool is the "Removal" tool – it removes an item from the pocket and this is fundamental for doing anything with items in the pocket. [Tools are not always nouns. As we see here, the action of Removal is a tool, also.]