What is an Algorithm?

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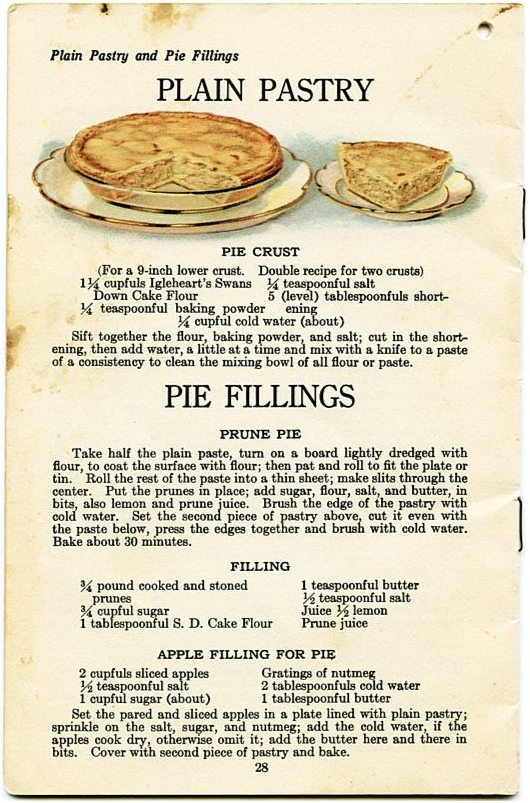
An algorithm is a sequence of steps that solves a problem or performs a task

What is an algorithm?

Algorithms exist in day-to-day life, outside of computers, such as when following the steps for a recipe, or putting together furniture



Plain Pastry and Pie Fillings

PLAIN PASTRY

PIE CRUST

(For a 9-inch lower crust. Double recipe for two crusts)

1¼ cupfuls Igleheart's Swans Down Cake Flour
¼ teaspoonful baking powder
¼ teaspoonful salt
5 (level) tablespoonfuls shortening
¼ cupful cold water (about)

Sift together the flour, baking powder, and salt; cut in the shortening, then add water, a little at a time and mix with a knife to a paste of a consistency to clean the mixing bowl of all flour or paste.

PIE FILLINGS

PRUNE PIE

Take half the plain paste, turn on a board lightly dredged with flour, to coat the surface with flour; then pat and roll to fit the plate or tin. Roll the rest of the paste into a thin sheet; make slits through the center. Put the prunes in place; add sugar, flour, salt, and butter, in bits, also lemon and prune juice. Brush the edge of the pastry with cold water. Set the second piece of pastry above, cut it even with the paste below, press the edges together and brush with cold water. Bake about 30 minutes.

FILLING

¾ pound cooked and stoned prunes
¾ cupful sugar
1 tablespoonful S. D. Cake Flour
1 teaspoonful butter
½ teaspoonful salt
Juice ½ lemon
Prune juice

APPLE FILLING FOR PIE

2 cupfuls sliced apples
½ teaspoonful salt
1 cupful sugar (about)
Gratings of nutmeg
2 tablespoonfuls cold water
1 tablespoonful butter

Set the pared and sliced apples in a plate lined with plain pastry; sprinkle on the salt, sugar, and nutmeg; add the cold water, if the apples cook dry, otherwise omit it; add the butter here and there in bits. Cover with second piece of pastry and bake.

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Algorithm example

Problem: Figure out how to reorganize your bookshelf

Will you reorganize by category? Author? ...

Take all the books off the shelf and put them in separate piles?

Or move one book at a time?

Solving problems with algorithms

In computer science, a problem or task can be stated as a relationship between **inputs** and **outputs**

Solving problems with algorithms

Problem: Given inputs of a list of integers, along with one specific integer, produce an output of **True** if the integer is found in the list, or an output of **0** if the integer is not in the list

Search a List of Integers

Input: $A[1 \ldots n]$, a list of integers,
and t, an integer.

Output: $i \in \{1, \ldots, n\}$ such that $A[i] = t$ if such exists,
and 0 otherwise.

```
"""
Given a List of Integers, declared under the variable A = [1, 2, 3, 4, 5]
and an Integer to look for declared under the variable t = 4

Search for t in A

Return True if t is in A
or
Return 0 if t is not in A
"""
```

Solving problems with algorithms

An algorithm instructs a computer how to solve a problem or perform a task by following a sequence of steps

A programmer figures out this sequence of steps, then writes it in a programming language such as Python so that the computer can understand it