Algorithms

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An algorithm is an ordered list of actions to solve a problem.

Actions in algorithms are:

- declarative
- feasible
- self-explanatory

Exercise 1
For each action below, is it appropriate for:

- an adult human?
- a computer?

(a) `do these sunglasses make me look cool?`

Answer: Unreasonable for both humans and computers (command is not declarative- in fact it's a question, not a command!)

(b) `go swimming in the pool`

Answer: Reasonable for humans, but unreasonable for computers (infeasible for computers to swim)

(c) `read data from the USB drive`

Answer: Reasonable for computers, but unreasonable for humans (infeasible for humans since they don't have a built-in USB drive)

(d) `compute the sum of 5 and 2`

Answer: Reasonable for computers and humans

(e) `search for the best rubber duck on the internet`

Answer: Unreasonable for computers and humans (not self-explanatory to either. Computers have no idea what a rubber duck is, while humans have to elaborate on what constitutes the "best" rubber duck).

Exercise 2
Write algorithms in pseudocode for the following problems:

Answers for developing algorithms may vary wildly. The following are just example of simple algorithms.

(a) Ordering a pizza for delivery from your favourite pizzeria

Answer:

Get phone receiver/cellphone

Dial pizzeria

Place order

End call

Put phone down

(b) Using a stapler to staple a pile of loose papers together

Answer:

Grab papers with one hand

Line paper edges up to be flush on all sides

Place top-left corner of pile under stapler head

Push down on stapler arm with free hand

Remove stapled papers from under stapler head

(c) Raking leaves in a yard

Answer:

While there are still leaves on grass:

Go to grassy patch where leaves are
Hold garbage bag in front of leaves
Place rake head onto ground opposite of garbage bag so leaves are between them
Pull rake towards leaves to catch leaves in rake head teeth
Pull rake with leaves into garbage bag

Put collected garbage bag of leaves into garbage can

Exercise 3

For each algorithm, identify the problem that it solves:

(a)

```
for each student in classroom roster:
     call out student's name
     if student does not stand up:
          write 'X' by student's name
```

Answer: The algorithm is conducting a class attendance check (we might name the algorithm `TakeClassAttendance`). The problem it is solving may be to perform an attendance check for a class to see who is absent for the day.

(b)

```
for each item on grocery list:
     go to aisle where item is located
     find item on shelf
     add item to cart
     cross item off grocery list
```

Answer: The algorithm is buying groceries at a store based on a list of items to buy (we might name the algorithm `ShopForGroceries`). The problem it is solving is buying a list of grocery items at a store.

(c)

```
locate signature line on paper
uncap pen
write name above the signature line
cap pen
```

Answer: The algorithm is for signing a piece of paper (we might name the algorithm `SignPaper`). There is no clear indication what we are signing, but the problem we are solving appears to be that we sign something. This solution is applicable to many problems! Signing a loan, signing your name on a test, etc.