NUS National University of Singapore

School of Computing

Algorithm Design
(Algorithm is A&E)
Video 6.3b

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Algorithm is Cool. Learn Algorithms.

Definition of Algorithm (1)

From Video 6.3a

Algorithm (my adopted definition):

a *sequence* of *unambiguous* and *executable* step-by-step *instructions* for *accomplishing a given task* in a *finite number of steps*.

Definition of Algorithm (2)

From Video 6.3a

Important Keywords in the definition:

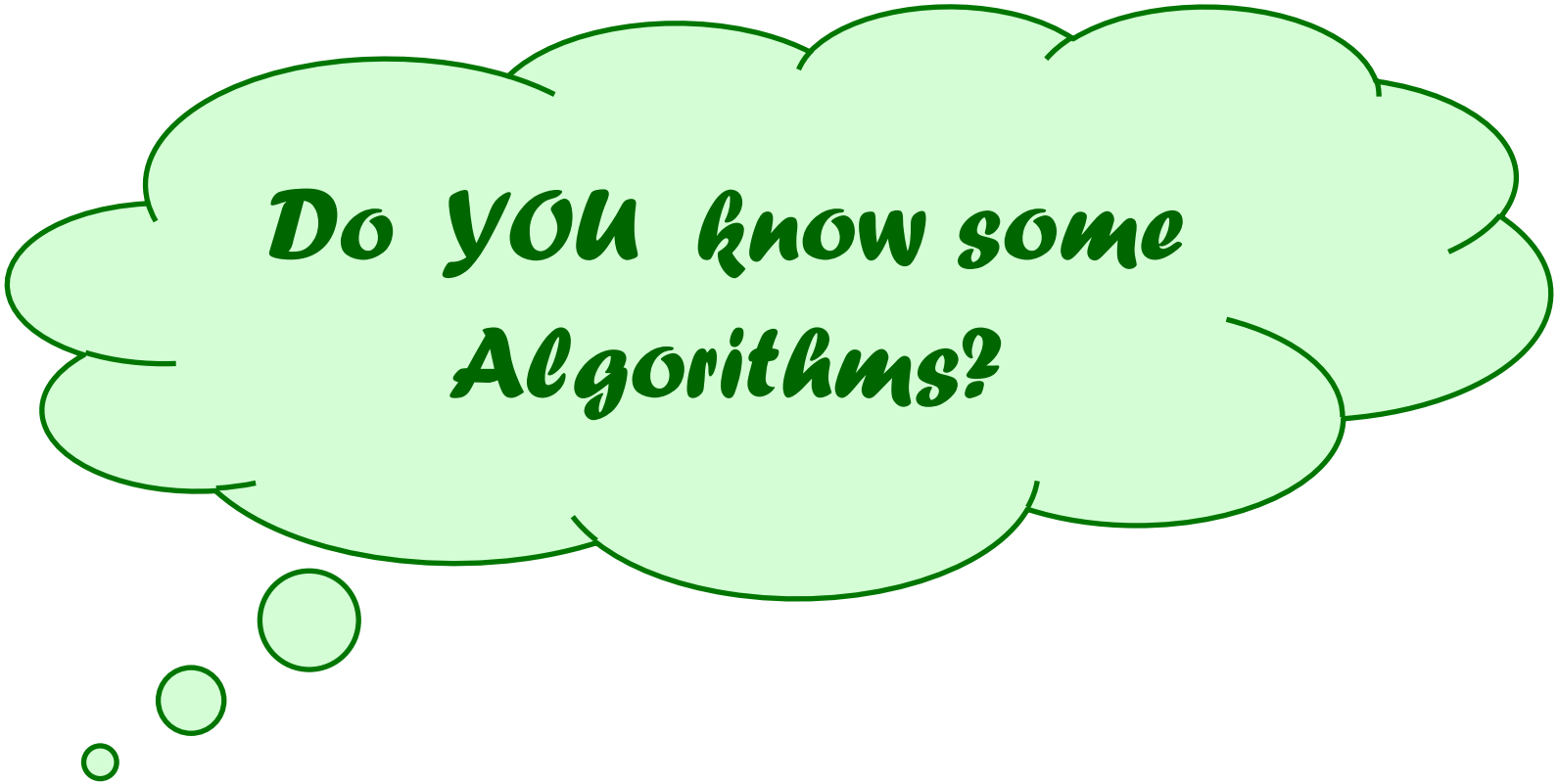
- ***Sequence*** of ***step-by-step instructions***
- Instructions are ***unambiguous***
  (meaning is clear, no ambiguity)
- Instructions are ***executable***
  (can be performed)
- Finish in a ***finite number of steps***
  (must terminate, cannot go on forever)
- ***Accomplishes the given task***
  (solves the intended problem)

Outline

Overview:

- Definition of Algorithm
- Algorithms in Everyday Life
- Some Old Algorithms
- Some Simple Algorithms
- Abstraction & Decomposition

Algorithm? WHAT?



Example of an Algorithm

- **Example of an algorithm (in everyday life):**

Step 1: Wet your hair
Step 2: Lather your hair
Step 3: Rinse your hair
Step 4: Lather your hair
Step 5: Rinse your hair
Step 6: Stop.

Algorithm in everyday life (2)

How to Make Instant Coffee

10 Second Summary

1. Place 1 to 2 teaspoons of instant coffee into a mug.
2. Add 1 to 2 teaspoons of sugar, if desired.
3. Pour in 1 cup (240 milliliters) of boiling water.
4. Stir until combined.
5. Add some milk or creamer, if desired.

http://www.wikihow.com/Make-Instant-Coffee

Algorithm in everyday life (3)

Making scrambled eggs;

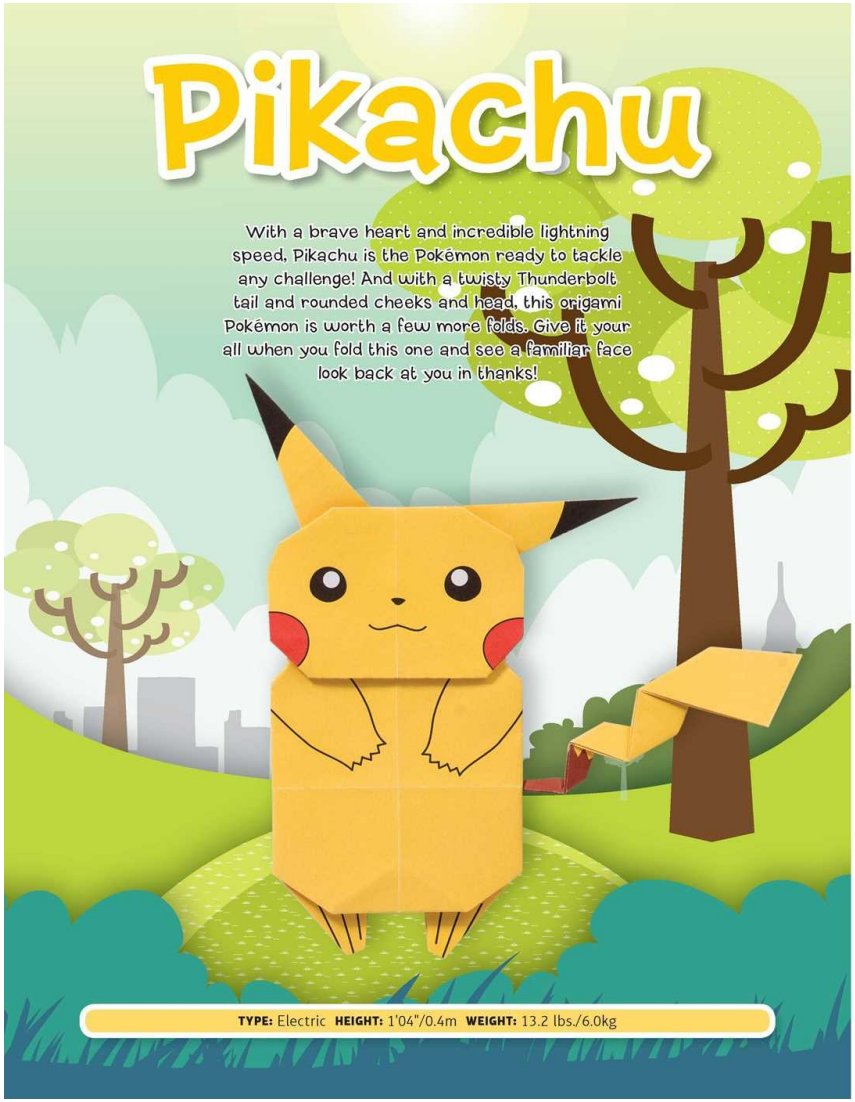
1. beating the eggs for 20-35 seconds in a bowl
2. heat a frying pan over a medium-low heat
3. melt some butter in the frying pan
4. cook eggs on the pan and stir eggs while cooking
5. add other ingredients
6. serve the scrambled eggs

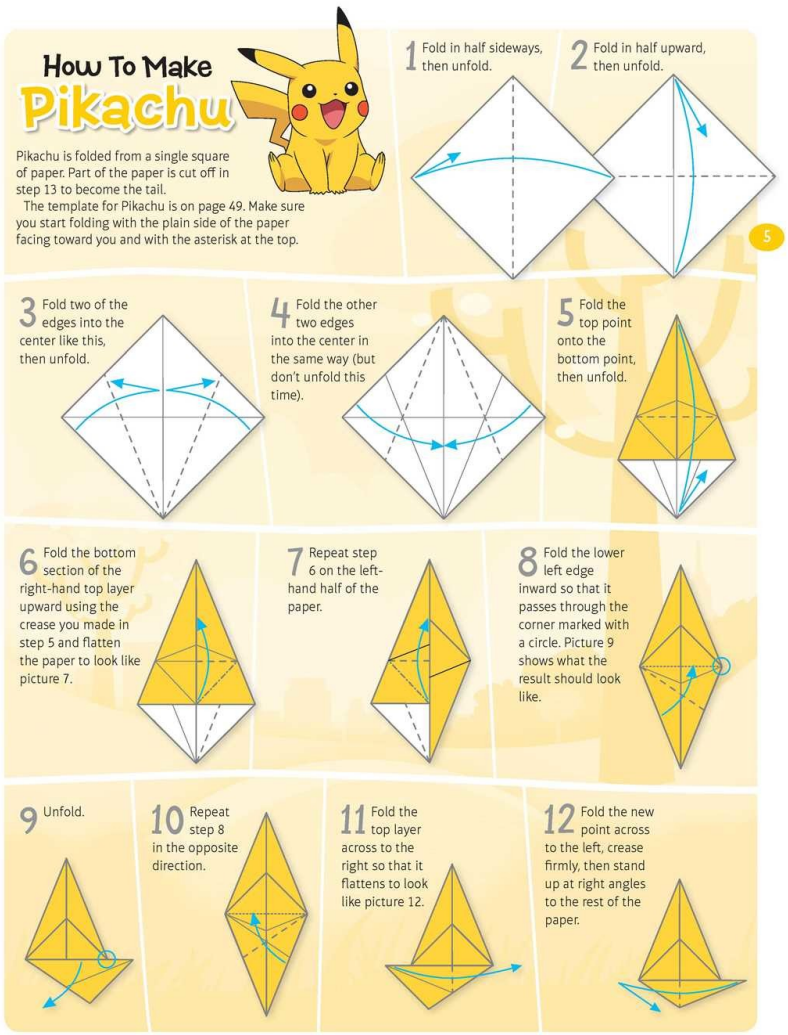
http://www.incredibleegg.org/cooking-school/egg-cookery/stovetop-scramble-eggs/

Algorithms in Everyday Life (1)

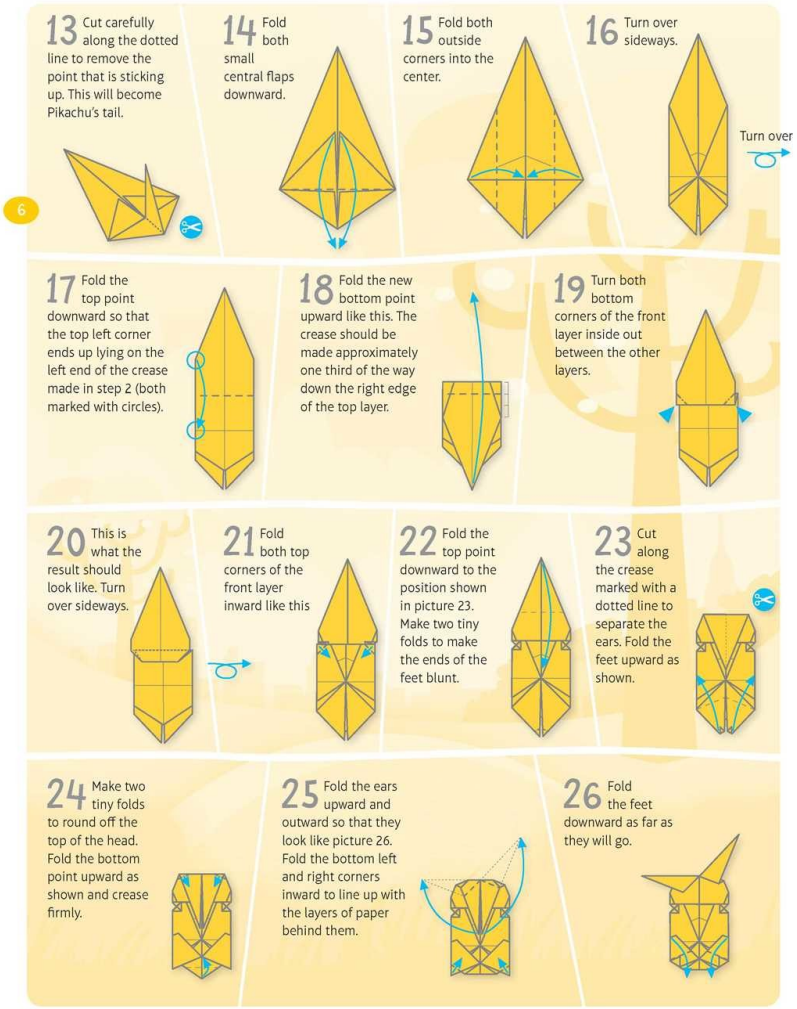
- How to shampoo your hair
- How to make instant coffee
- How to make scrambled eggs
- How to assemble your IKEA dining table
- How to assemble your new bicycle
- How to do dog training
- How to fold an origami chukapi?
- How to make friends ???

How to make a chukapi?

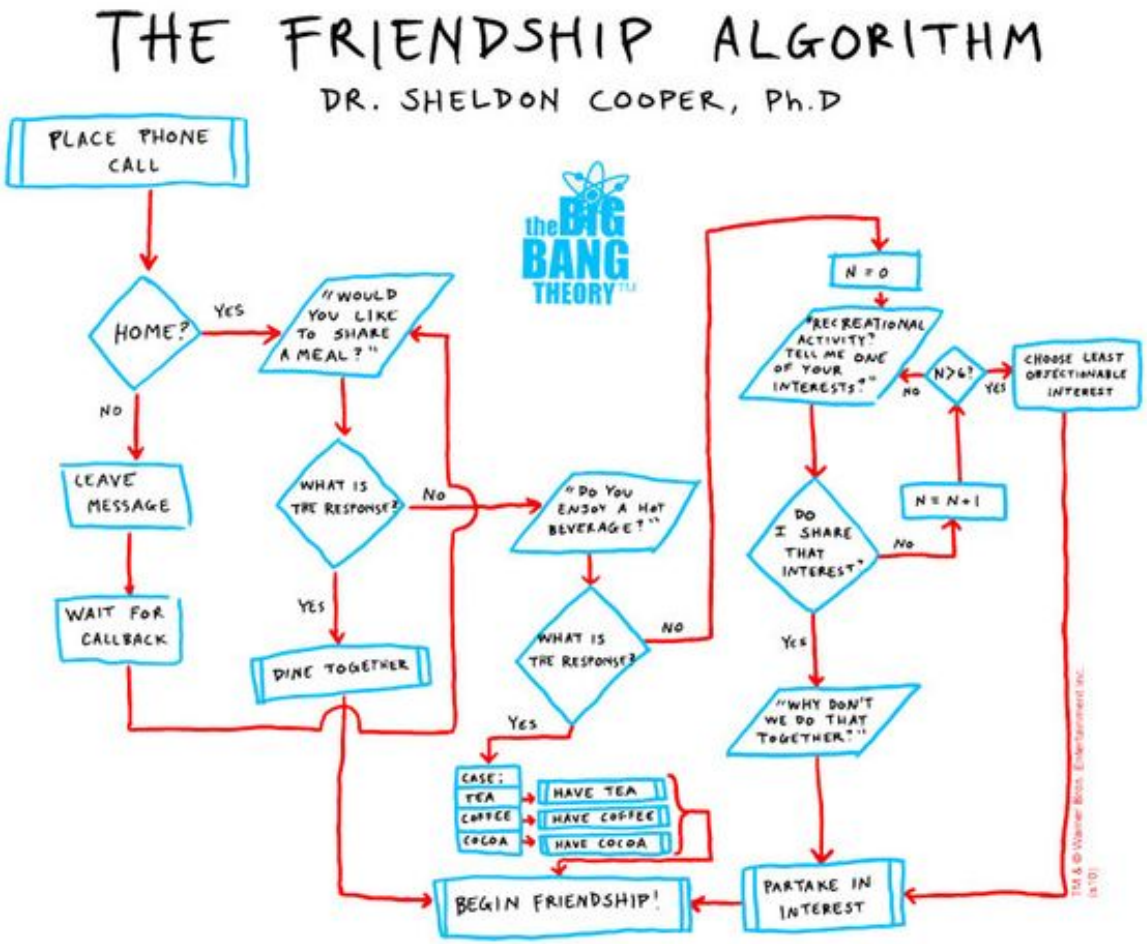




OK… How to fold a pikachu.

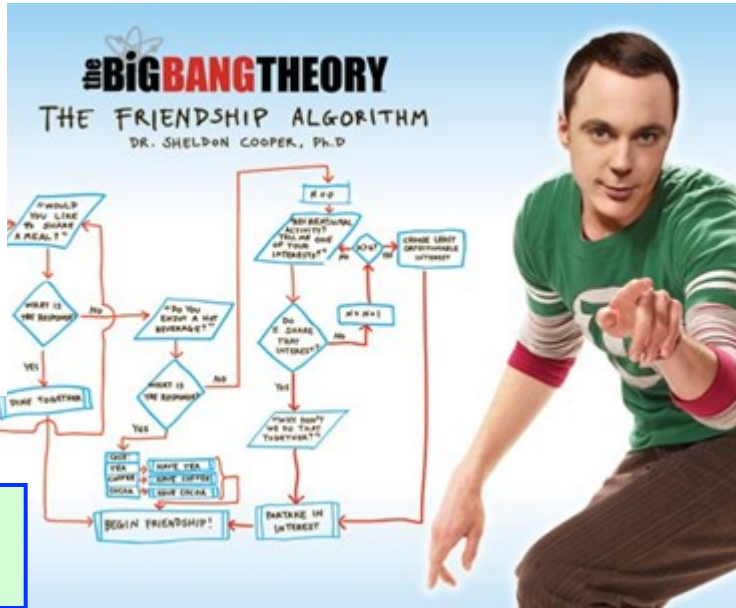


How to Make Friends?



The Big Bang Theory

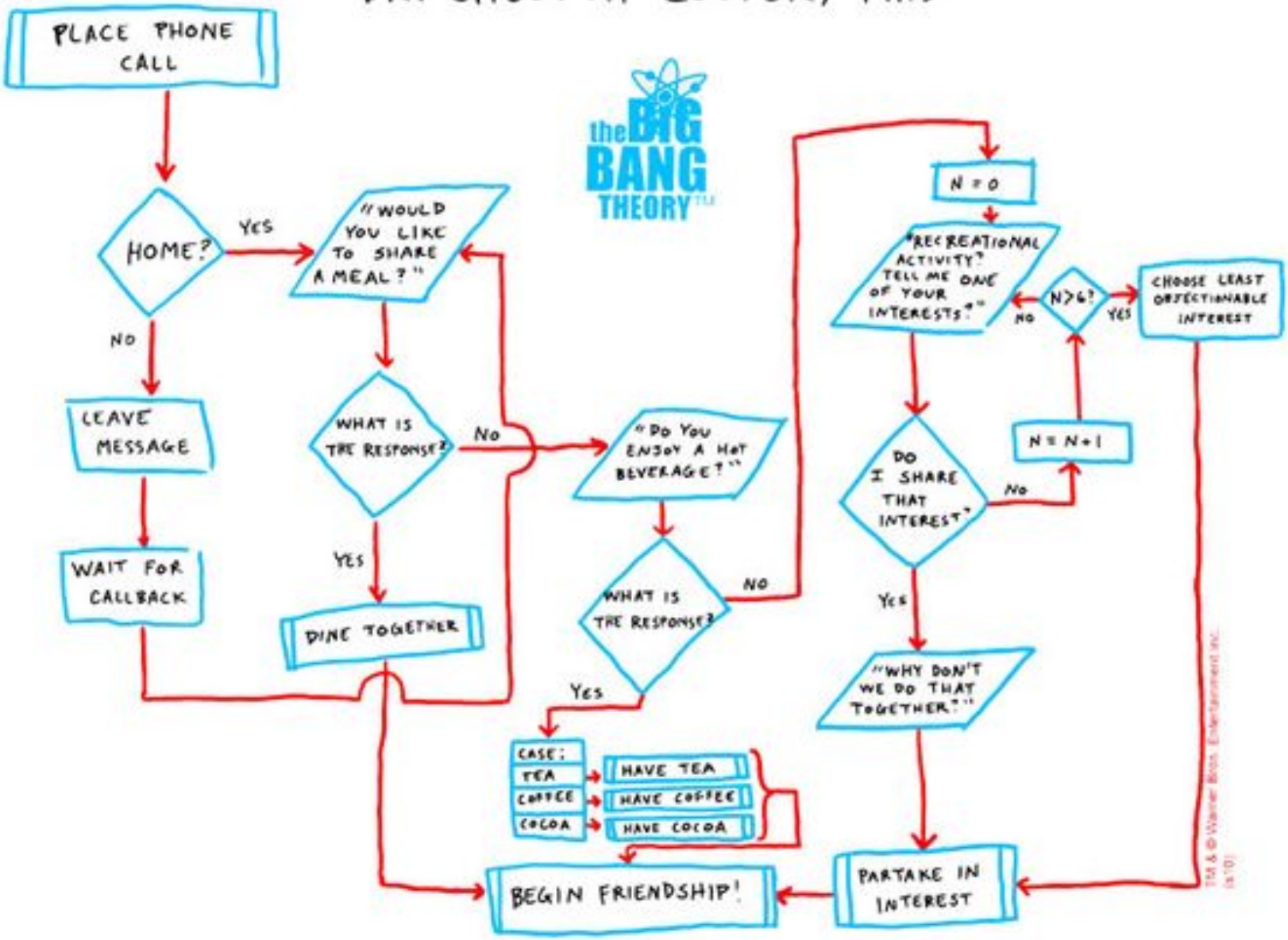
(TV Series)



Source: The Big Bang Theory - The Friendship Algorithm:
https://www.youtube.com/watch?v=k0xgjUhEG3U

THE FRIENDSHIP ALGORITHM

DR. SHELDON COOPER, Ph.D



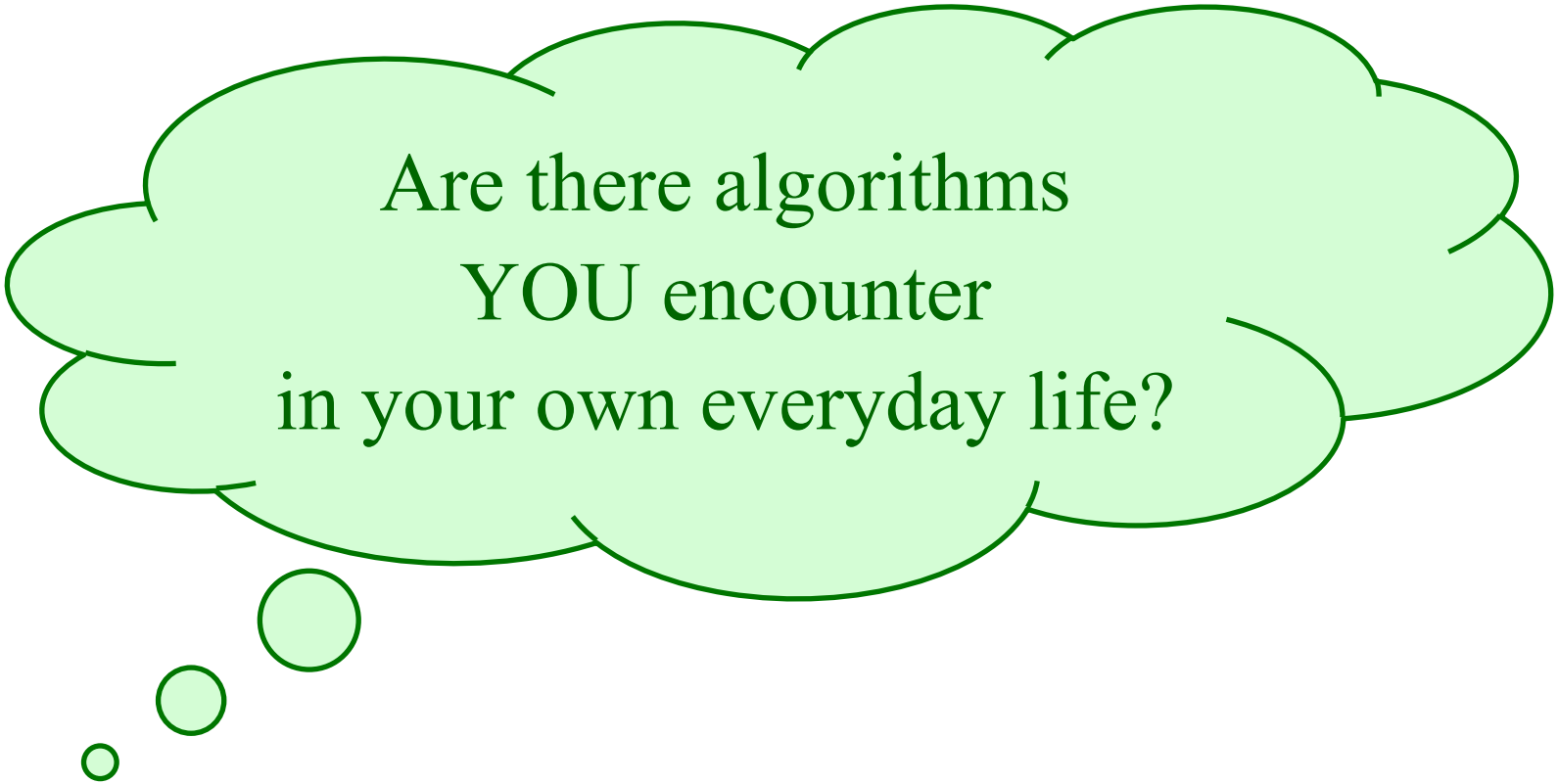
Algorithms in Everyday Life (2)

- How to find the largest of 3 numbers;
- How to add two 8-digit numbers;
- How to sort 1280 library books alphabetically;
- How to find the best route from NUS-SOC to Kuala Kubu Bahru in West Malaysia
- How to divide *n* (indivisible) items of different values between two people as equally as possible.

Algorithms in Everyday Life (3)

- How to schedule deliveries to a supermarket from a warehouse
- How to schedule deliveries to *n* supermarkets from a warehouse
- How to schedule deliveries to *n* supermarkets from *m* warehouses
- How to match *n* interns to *n* companies
- Where to park airplanes that arrive at an airport

Reflection… think!



Is there an algorithm hidden inside?

NUS WebMail | Student Email

The Freedom to access your NUSmail *anytime* and *anywhere*.

- This is a shared computer
- This computer is only used by me

Note:

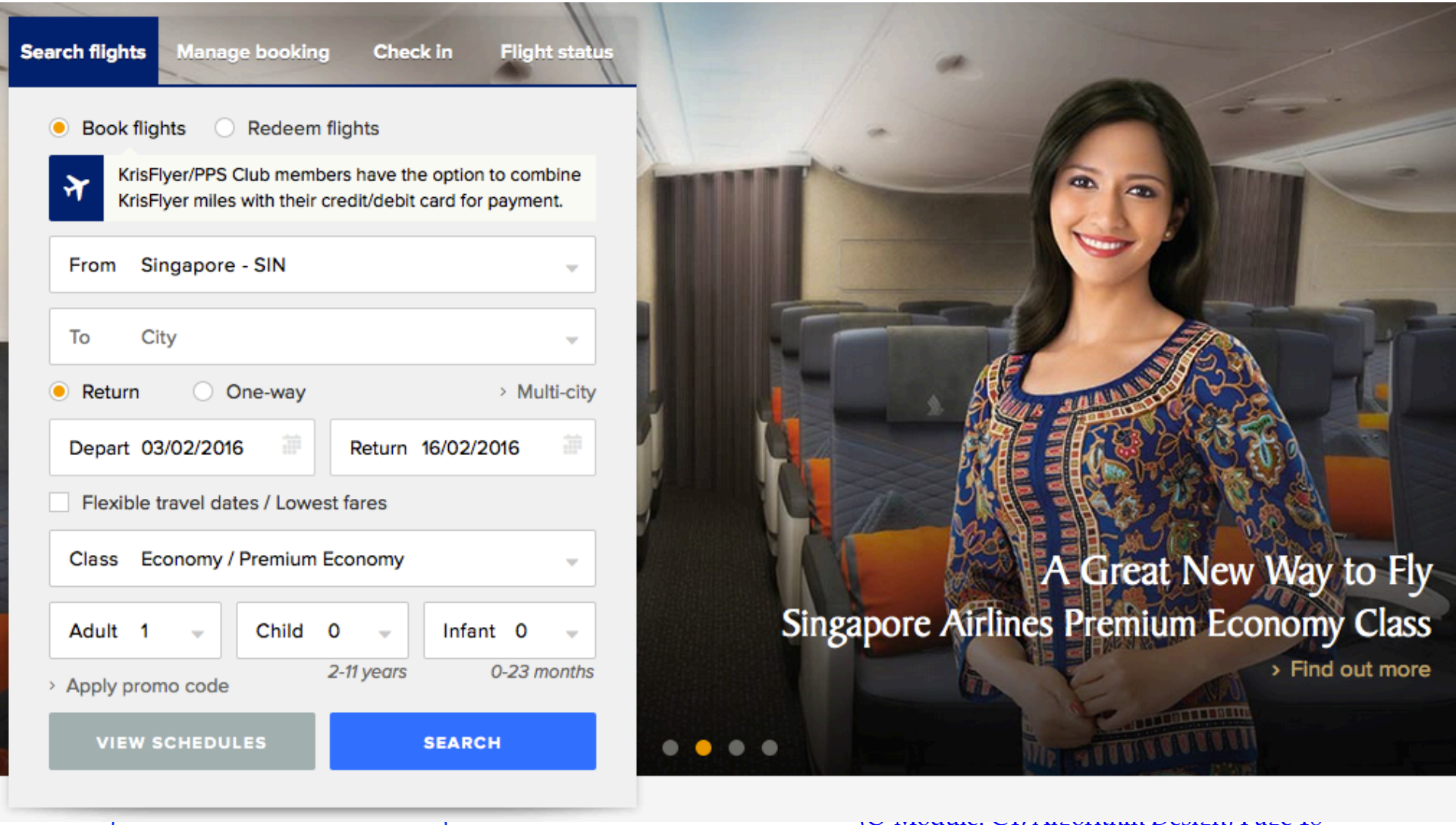
- nusstf\UserID for NUS Staff
- nusstu\UserID for NUS Student
- nusext\UserID for NUS Visitors
- Login to AlumMAIL for NUS Alumni
- firstname_lastname@nuhs.edu.sg for NUHS

Password

Sign in

I forgot my password!

Is there an algorithm hidden inside?



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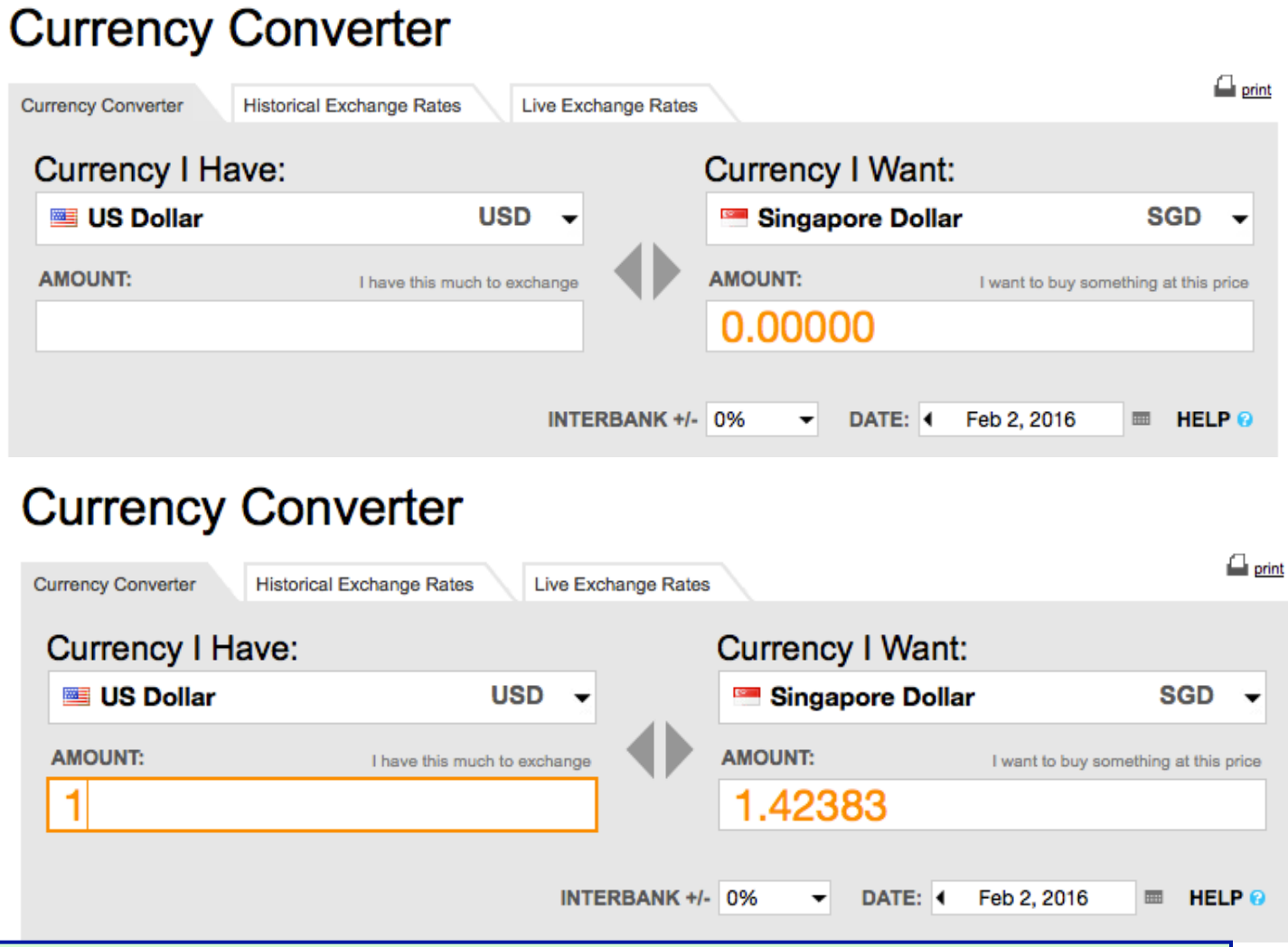
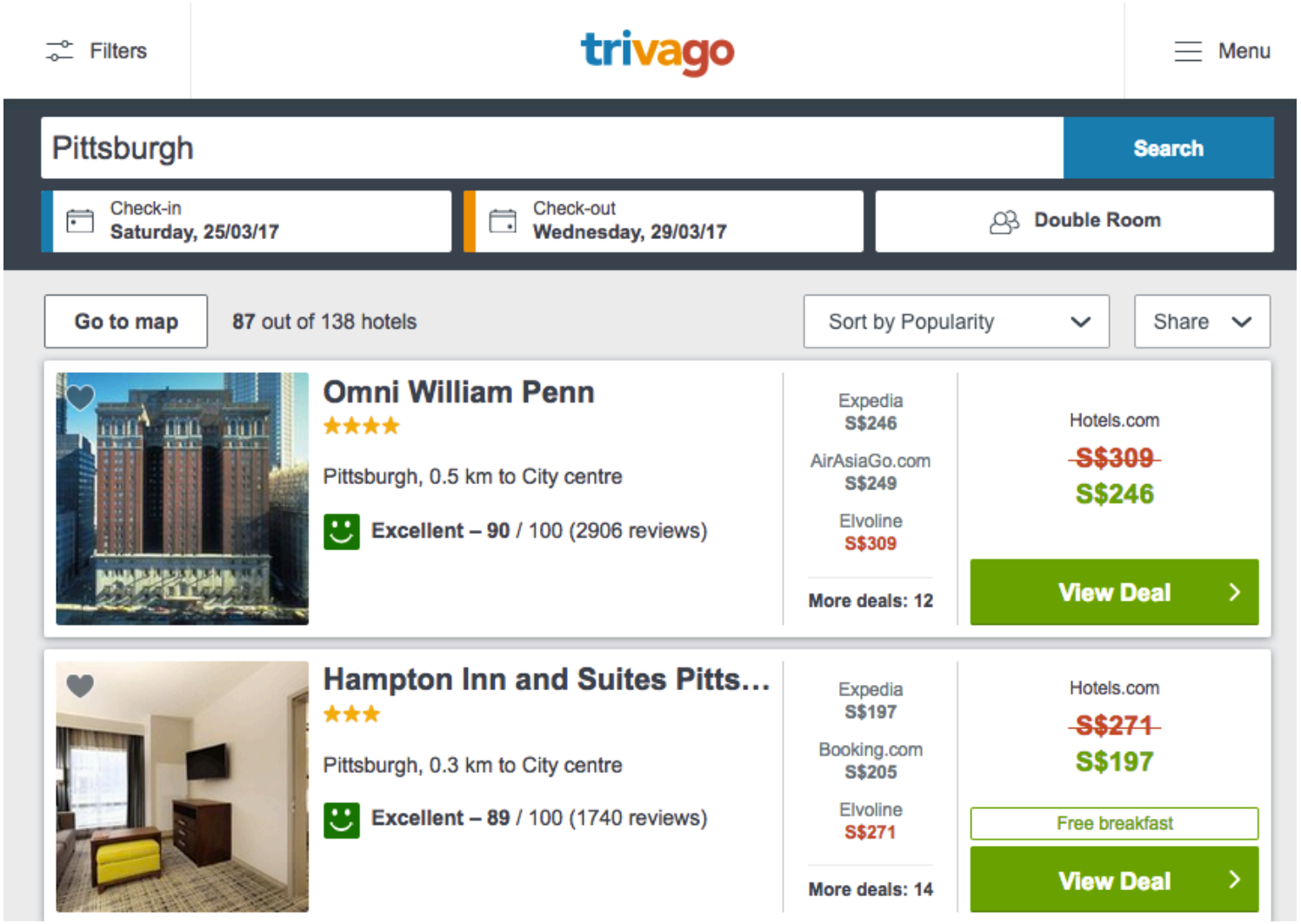


https://www.oanda.com/currency/converter/

Is there an algorithm hidden inside?



http://www.trivago.sg/

ITeMS…

The next time you see
something Anywhere and Everyone,
what must you ask?

Is there an Algorithm hidden inside there?

(End of video 6.3b)

If you want to contact me,

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