

Algorithm Design

(Algorithm is A&E)

Video 6.36

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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?



***Do YOU know some
Algorithms?***

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;

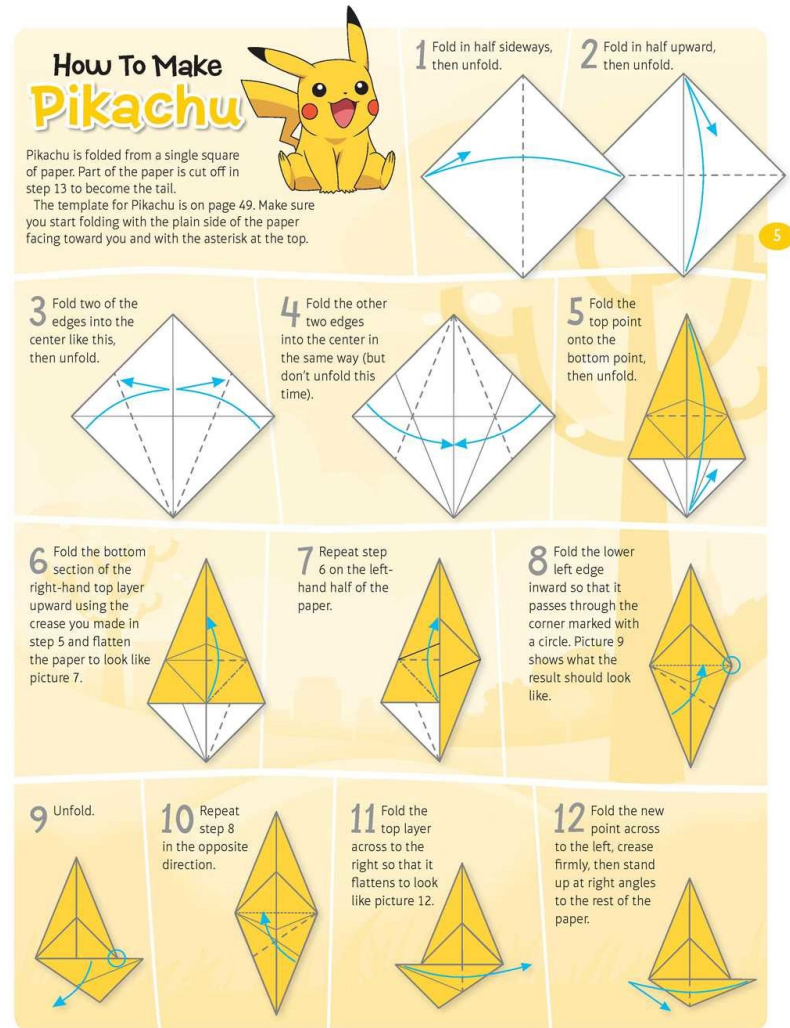
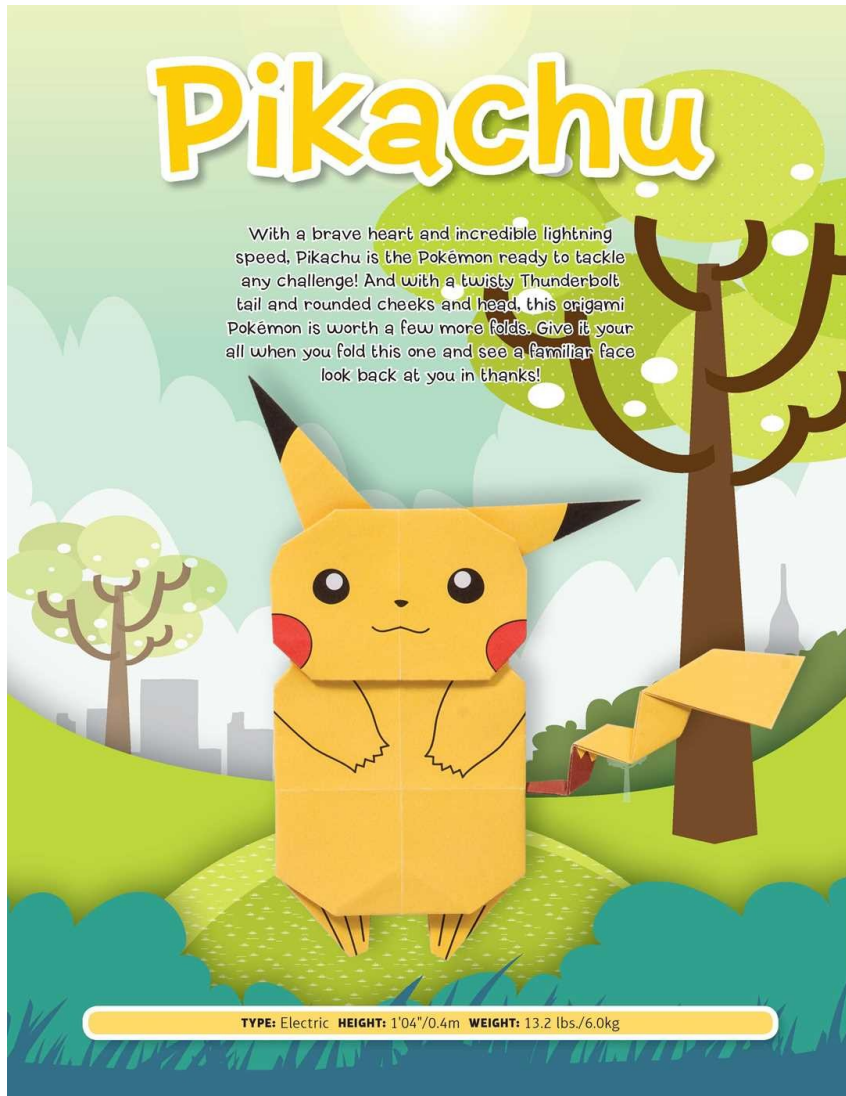
1. beating the eggs for 20-35 seconds in a bowl
2. heat a frying pan over a medium-low heat
3. melt some butter in the frying pan
4. cook eggs on the pan and stir eggs while cooking
5. add other ingredients
6. serve the scrambled eggs

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

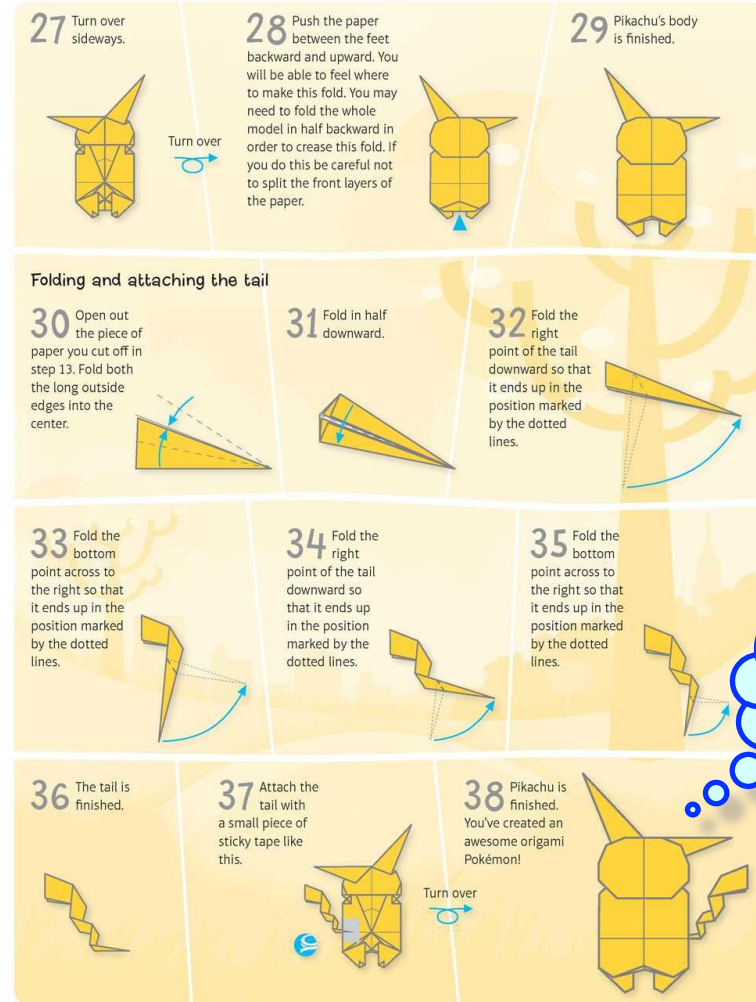
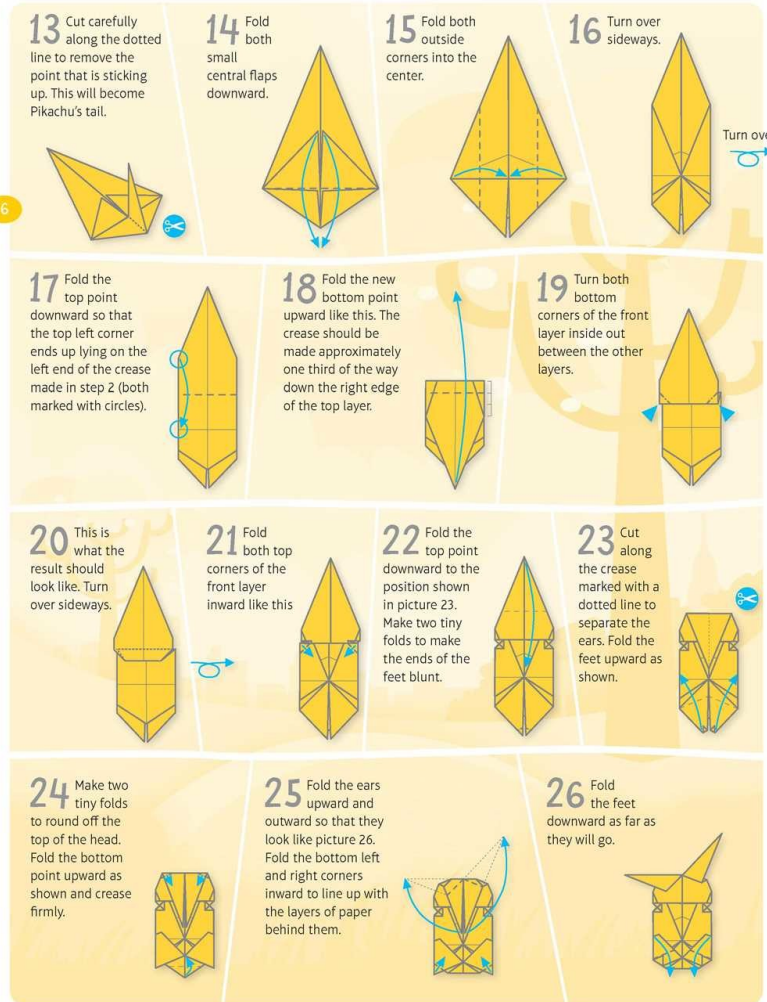
Algorithms in Everyday Life (1)

- ☐ 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?



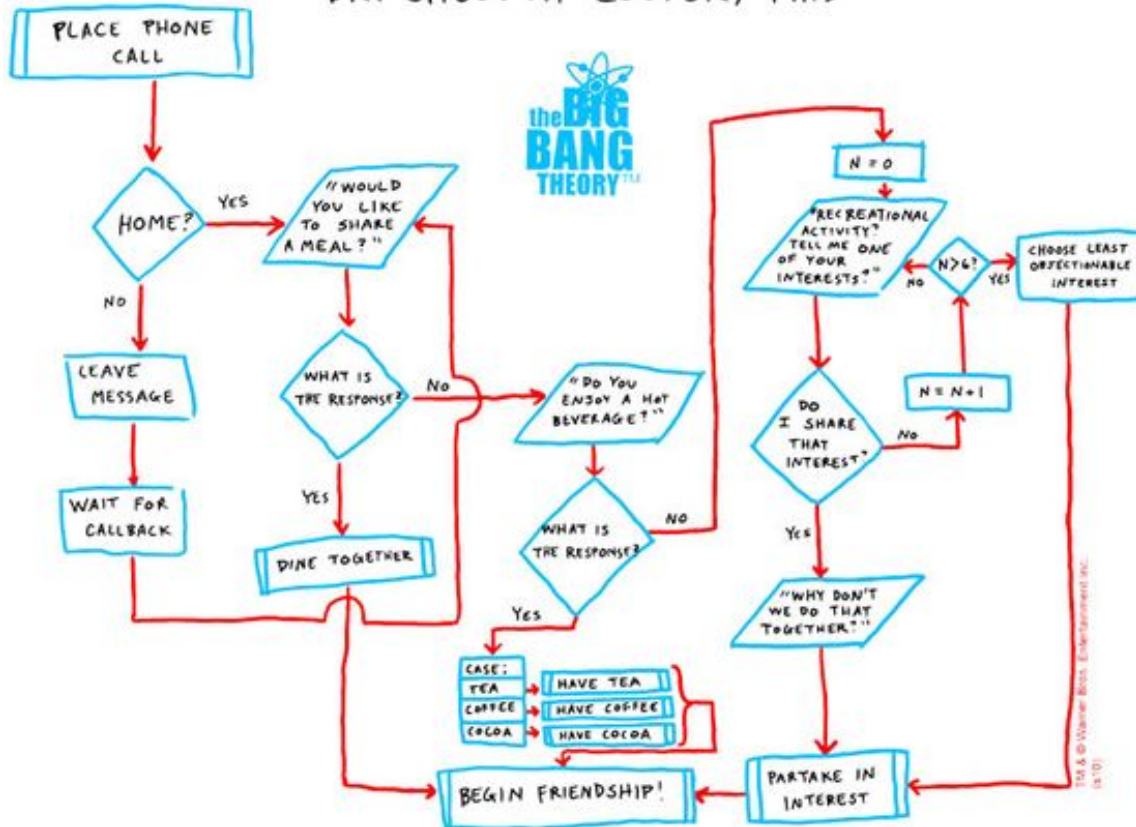
OK... How to fold a pikachu.



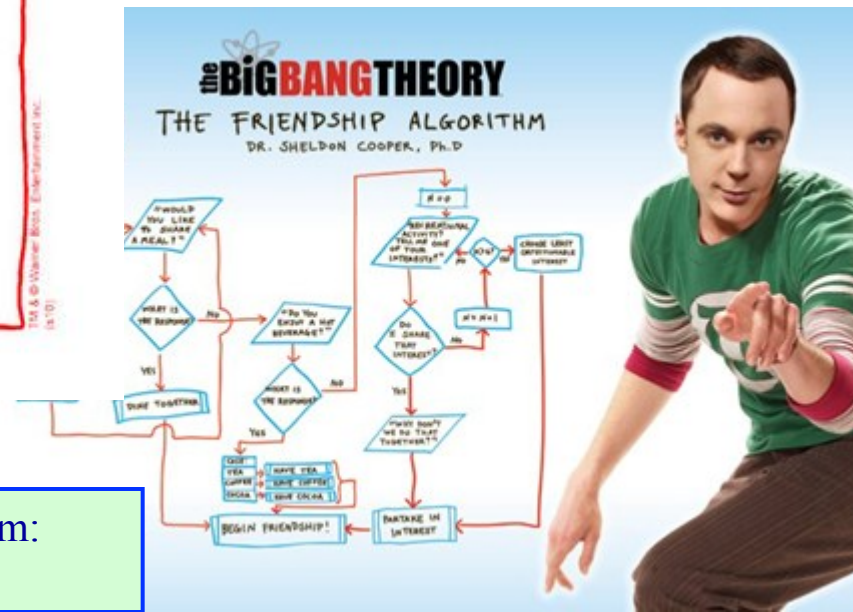
How to Make Friends?

THE FRIENDSHIP ALGORITHM

DR. SHELTON COOPER, Ph.D



The Big Bang Theory
(TV Series)

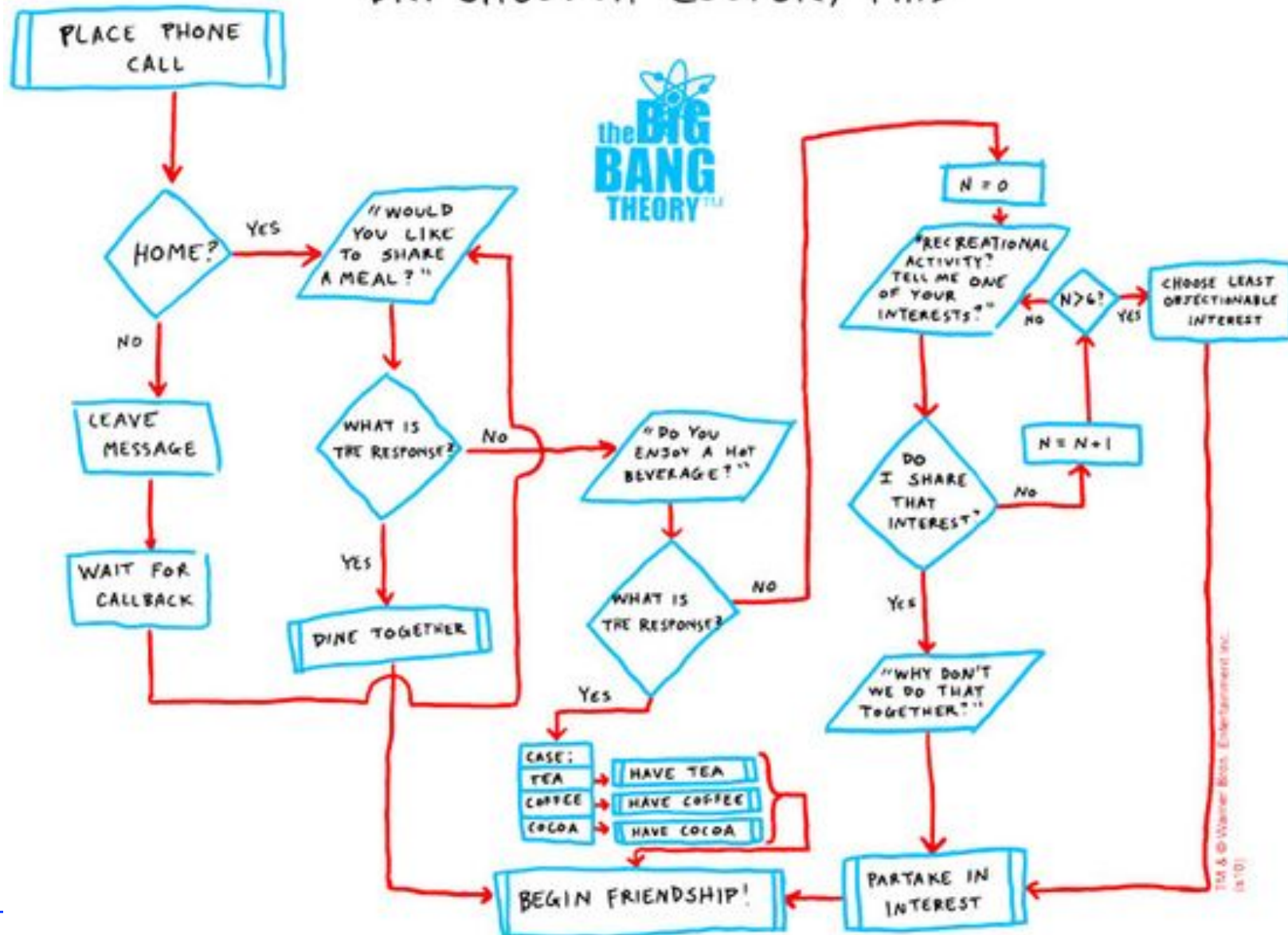


Source: The Big Bang Theory - The Friendship Algorithm:

<https://www.youtube.com/watch?v=k0xgjUhEG3U>

THE FRIENDSHIP ALGORITHM

DR. SHELTON COOPER, Ph.D



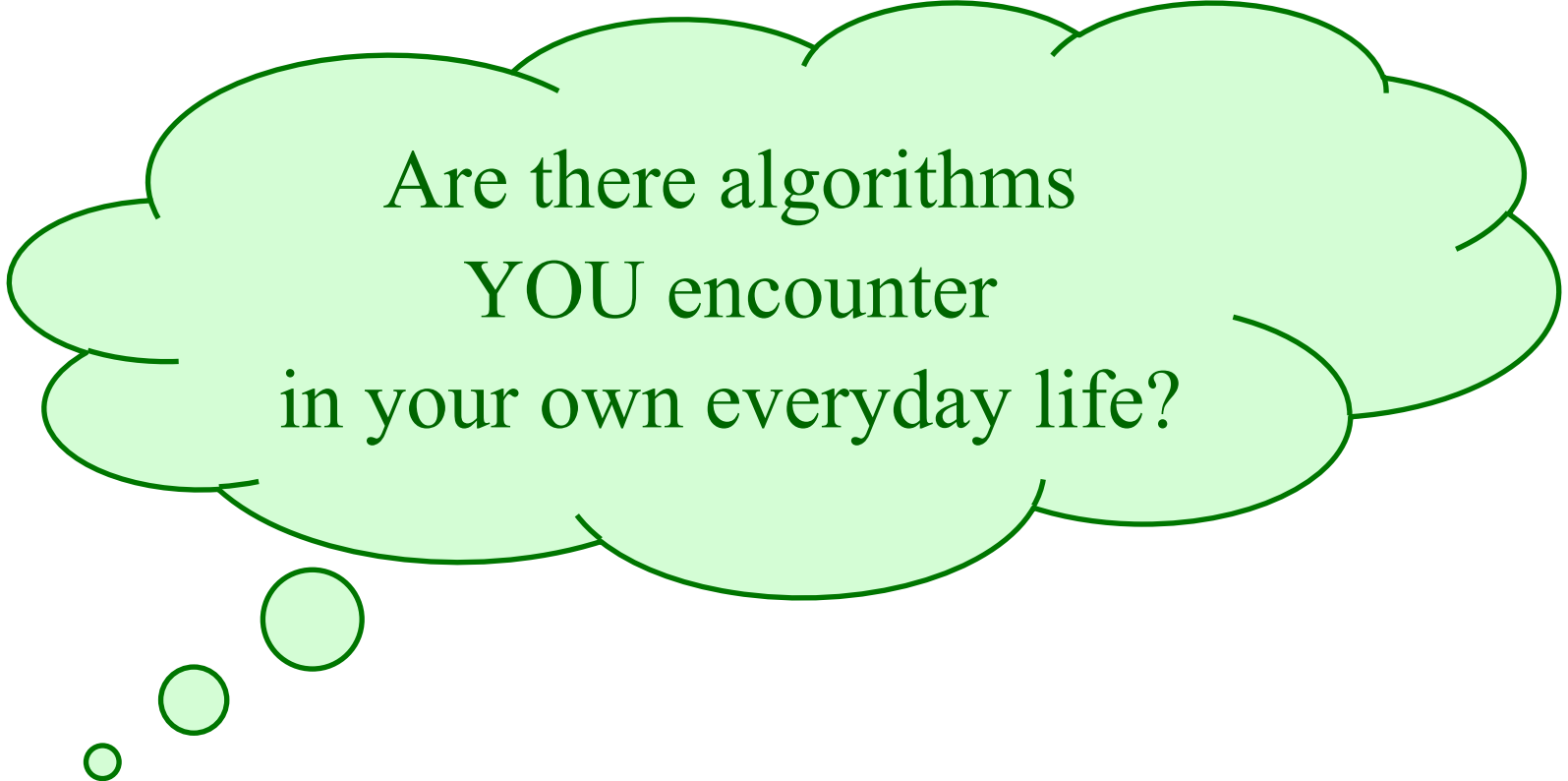
Algorithms in Everyday Life (2)

- ❑ 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!



Are there algorithms
YOU encounter
in your own everyday life?

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?

Search flights Manage booking Check in Flight status



☒ Book flights ☐ Redeem flights

 KrisFlyer/PPS Club members have the option to combine KrisFlyer miles with their credit/debit card for payment.

From **Singapore - SIN** ▼

To **City** ▼

☒ Return ☐ One-way > Multi-city

Depart **03/02/2016**  Return **16/02/2016** 

☐ Flexible travel dates / Lowest fares

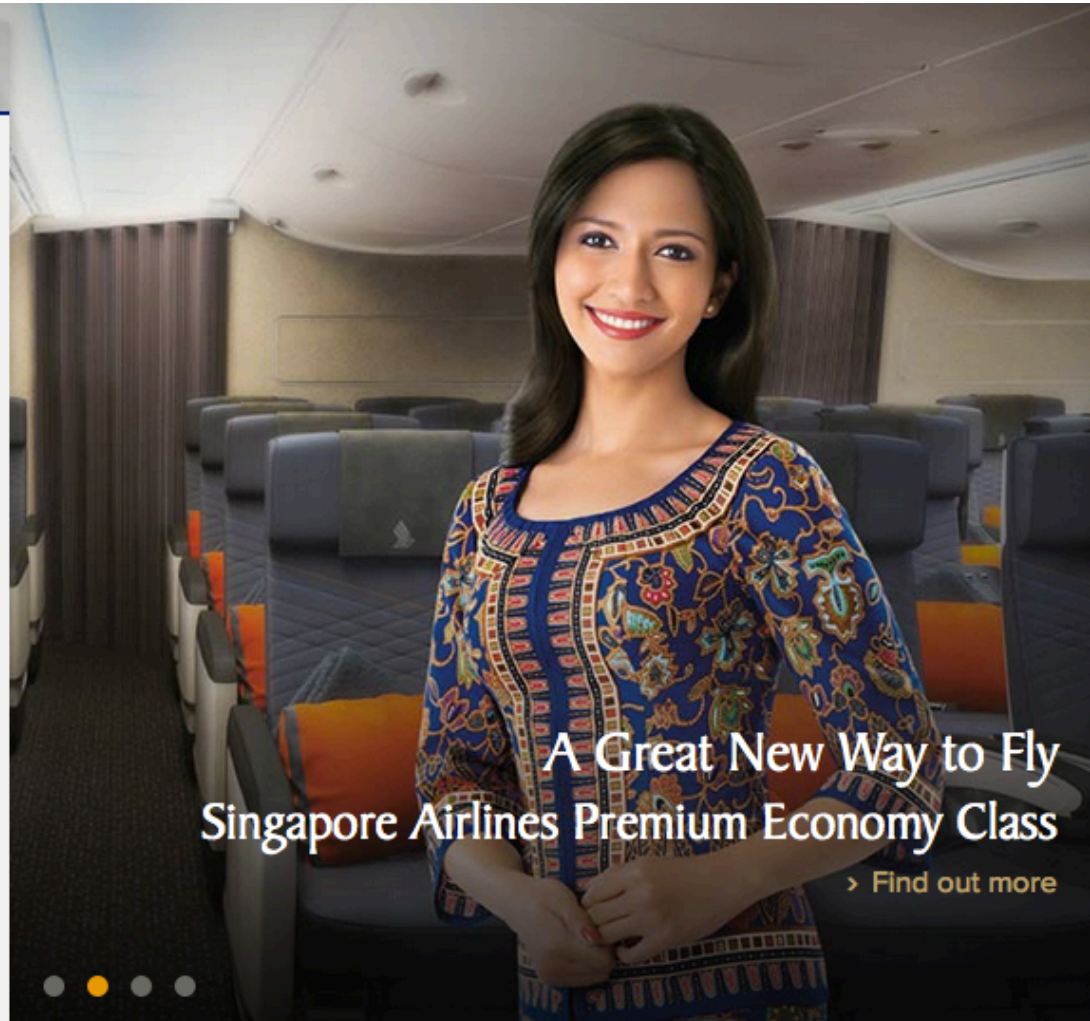
Class **Economy / Premium Economy** ▼

Adult **1** ▼ Child **0** ▼ Infant **0** ▼

2-11 years 0-23 months

> Apply promo code

VIEW SCHEDULES **SEARCH**



Is there an algorithm hidden inside?

Currency Converter

Currency Converter Historical Exchange Rates Live Exchange Rates print

Currency I Have: Currency I Want:

AMOUNT: I have this much to exchange AMOUNT: I want to buy something at this price

INTERBANK +/- DATE: [HELP ?](#)

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Currency Converter Historical Exchange Rates Live Exchange Rates print

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INTERBANK +/- DATE: [HELP ?](#)

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

Is there an algorithm hidden inside?

[Filters](#)

trivago

Menu

Check-in
Saturday, 25/03/17

Check-out
Wednesday, 29/03/17

Double Room

87 out of 138 hotels

Sort by Popularity

Share

Omni William Penn
★★★★
Pittsburgh, 0.5 km to City centre
 Excellent – 90 / 100 (2906 reviews)

Expedia
S\$246

AirAsiaGo.com
S\$249

Elvoline
S\$309

More deals: 12

Hotels.com
~~S\$309~~
S\$246

Hampton Inn and Suites Pitts...
★★★
Pittsburgh, 0.3 km to City centre
 Excellent – 89 / 100 (1740 reviews)

Expedia
S\$197

Booking.com
S\$205

Elvoline
S\$271

More deals: 14

Hotels.com
~~S\$271~~
S\$197

<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 6.36)

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School of Computing