thought exercises 0 (a set for the week before classes)

author john k johnstone jkj at uab dot edu

version Fall 2019

Here are some thought exercises to explore before class. We will also explore them in the first lab and in lecture. Starred exercises are trickier than unstarred exercises.

Thought exercises will be used to explore concepts in computer science, and hopefully gradually get you thinking like a computer scientist.

exercise 0: interpreting code

teaser can you explain why 2+3*4 is 14 and not 20?
context for exercise 0 it is important that a computer have a unique interpretation of code, say of the code `2+3*4`, so rules must be established to remove any ambiguity
exercise 0.0 can you explain why 2+3*4 is 14 and not 20? what is this concept called?
exercise 0.1 * can you find the official Python documentation for this concept? (tricky)
in particular, there is a table at *docs.python.org/3* that fully defines this concept in Python: what section is it in? (getting the name of the concept will help); it's fine if this page or table looks confusing: it should look confusing at this stage (the table generalizes the concept to many other cases); the task is to locate the information, not to understand it yet
exercise 0.2 in exercise 0.0, we applied two different operators, addition and multiplication; now consider applying the same operator many times in an expression; can you explain why 6/2/3 is 1? what is the other choice for this value, if we had used a different rule?
exercise 0.3 * can you find an arithmetic operator that uses a different rule than exercise 0.2? (tricky)

---

exercise 1: functions

teaser what is a function?
context functions will be central to this course, although we will tweak the concept from the mathematical perspective (that you have seen up to now) to a computer science perspective
exercise 1.0 how is a function defined in mathematics? how many different definitions can you find?
exercise 1.1 gather 5 examples of functions (and ideally, what these functions represent)
here's one to get you started: the cosine function $\cos(x)$, where x is an angle in radians; it represents the x-coordinate of the unit circle (the circle of radius 1 centered at the origin); if it has been a while since you last used the cosine function, review its definition and graph

do not turn the page until you are done with the exercises (!)

reward

- enjoy this cartoon as a reward for all this thought

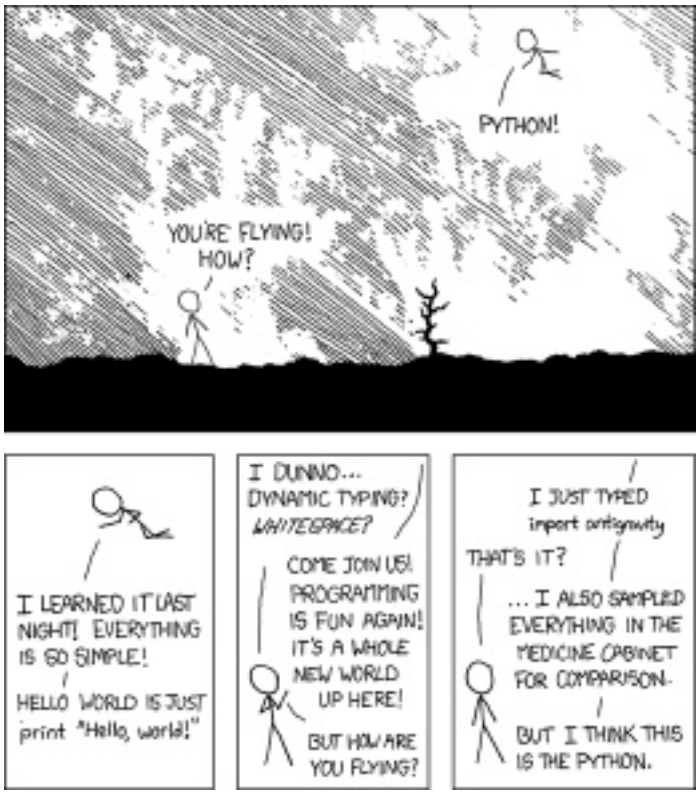

Figure 1: a famous Python cartoon

- can you track down the source of this famous cartoon?
  a) who is the cartoonist? b) what is the number of the cartoon?