CS 61A
Summer 2020

Introduction

Discussion 0: June 23, 2020

1 Lost on the Moon

Your spaceship has just crashed on the moon. You were scheduled to rendezvous with a mother ship 200 miles away on the lighted surface of the moon, but the rough landing has ruined your ship and destroyed all the equipment on board except for the 15 items listed below.

Your crew's survival depends on reaching the mother ship, so you must choose the most critical items available for the 200-mile trip. Your task is to rank the 15 items in terms of their importance for survival. Place a number 1 by the most important item, number 2 by the second most important, and so on, through number 15, the least important.

Item	Your Rank (1)	Group's Rank (2)	NASA's Rank (3)	$\lvert(3)-(1)\rvert$	$\lvert(3)-(2)\rvert$
Box of matches					
Food concentrate					
50 feet of nylon rope					
Parachute silk					
Solar-powered portable heating unit					
Two .45 caliber pistols					
One case of dehydrated milk					
Two 100-pound tanks of oxygen					
Stellar map (of the moon's constellations)					
Self-inflating life raft					
Magnetic compass					
5 gallons of water					
Signal flares					
First-aid kit containing injection needles					
Solar-powered FM receiver-transmitter					
Total					

Error points are the absolute difference between your rankings and NASA's (disregard plus or minus signs).

- 0 - 25: excellent
- 26 - 32: good
- 33 - 55: fair
- 56 - 70: oops
- 71 - 112: oh well

Item	NASA's Reasoning	NASA's Rank
Box of matches	No oxygen to sustain flame, virtually worthless	15
Food concentrate	Efficient means of supplying energy requirements	4
50 feet of nylon rope	Useful in scaling cliffs, tying injured together	6
Parachute silk	Protection from sun's rays	8
Solar-powered portable heating unit	Not needed unless on dark side	13
Two .45 caliber pistols	Possible means of self-propulsion	11
One case of dehydrated milk	Bulkier duplication of food concentrate	12
Two 100-pound tanks of oxygen	Most pressing survival need	1
Stellar map (of the moon's constellations)	Primary means of navigation	3
Self-inflating life raft	CO_2 bottle in military raft may be used for propulsion	9
Magnetic compass	Magnetic field on moon is not polarized; worthless for navigation	14
5 gallons of water	Replacement for tremendous liquid loss on lighted side	2
Signal flares	Distress signal when mother ship is sighted	10
First-aid kit containing injection needles	Needles for vitamins, medicines, etc., will fit special aperture in NASA space suits	7
Solar-powered FM receiver-transmitter	For communication with mother ship; but FM requires line-of-sight transmission and short ranges	5

Secrets to Success in CS 61A

CS 61A is definitely a challenge, but we all want you to learn and succeed, so here are a few tips that might help:

- Ask questions. When you encounter something you don't know, *ask*. That is what we are here for. This is not to say you should raise your hand impulsively, but you are going to see a lot of challenging stuff in this class, and you can always come to us for help.
- Study in groups. Again, this class is not trivial; you might feel overwhelmed going at it alone. Send a message and reach out to other students in the class! Work together, either on homework, on lab, or for midterms, as long as you don't violate the cheating policy!
- Go to office hours. Office hours give you time with the instructor or TAs by themselves, and you will be able to get some (nearly) one-on-one instruction to clear up confusion. You are *not* intruding; the instructors and TAs *like* to teach! Remember, if you cannot make office hours, you can always make separate appointments with us!
- Do (or at least attempt seriously) all the homework. We do not give many homework problems, but those we do give are challenging, time-consuming, and rewarding.
- Do all the lab exercises. Most of them are simple and take no more than an hour or two. This is a great time to get acquainted with new material. Come to office hours if you need more guidance!
- Optional lab questions are "optional" in the sense that they are extra practice, not that they are material that's out of scope. Make sure you do them if you have time!
- Do the readings before lecture! There is a reason why they are assigned. And it is not because we are evil; that is only partially true.
- When preparing for the midterms and final, do past exam questions! Lecture, lab, and discussion provide a great introduction to the material, but the only way to learn how to solve exam-level problems is to do exam-level problems.
- Most importantly, *have fun!*

2 Python Basics (Optional)

Primitive expressions

A **primitive expression** requires only a single evaluation step. Literals, such as numbers and strings, evaluate to themselves. Names require a single lookup step (see the *Assignment statements* section below).

```
>>> 2
2
>>> 'Hello World!'
'Hello World!'
```

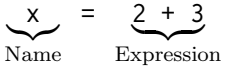
Arithmetic expressions

Arithmetic expressions in Python are very similar to ones we've seen in other math contexts. They involve binary arithmetic operators (`+`, `-`, `*`, `/`, `//`, `%`, and `**`) and follow PEMDAS rules.

```
>>> 6 + 2 * 5
16
>>> 9 // 2     # Floor division (rounding down)
4
>>> 9 % 2      # Modulus (remainder of 9 // 2)
1
>>> (3 + 2) * 4 // 3
6
>>> 4 ** 3     # Exponent
64
```

Assignment statements

An assignment statement assigns a certain value to a variable name.



To execute an assignment statement:

1. Evaluate the expression on the right-hand-side of the statement to obtain a value.
2. Bind the value to the name on the left-hand-side of the statement.

Let's try to assign the primitive value 6 to the name `a`, and subsequently do a lookup on `a`.

```
>>> a = 6
>>> a
6
```

Now, let's reassign `a` to another value. This time, let's use a more complex expression. Note that the name is bound to the value, not the expression!

```
>>> a = (3 + 5) // 2
>>> a
4
```

Questions

2.1 What would Python display?

```
>>> 3 + 4 ** 2
```

19

```
>>> a = 6 + 2 * 4
>>> a
```

14

```
>>> b = (2 + 2) * 2 + 3 % 2
>>> b
```

9

```
>>> a + 2 * b
```

32

```
>>> b += a      # Equivalent to b = b + a
>>> a
```

14

```
>>> b
```

23