Value, Expressions, and Variables

Outline

CSCI 050 PO

- Welcome to CSCI 050 PO!
- We're going to learn how to program computers
  - It will be fun
- The course will end roughly at Fall break
  - But until then we meet twice a week
  - And you'll meet once a week outside of class in small groups

About me

- (Professor|Prof|Dr) (Osborn|O)
- He/they pronouns
- I work in technical game design research
- Semi-competitive Splatoon 3 player
  - Top 1000 in X Rank (Tentatek League)
  - Trying to get into coaching a team
  - Hit me up if you're interested!

Assessment

- In-class quizzes (13): 30%
- Final exam (in-class): 40%
- Assignments (6): 30%

Quizzes are review and memory practice; assignments are skills practice; and the exam measures how well you learned the material during the class.

Communication

- Class announcements and Q&A on Slack: #csci-050-po-2526-fa
  - You have already been added to the channel
  - Go to pomonacollege.enterprise.slack.com and sign into the student workspace
  - Download the app for your computer and/or phone
- Your small group will also have a slack group DM
  - Small group participation is mandatory
- Emailing me is also OK

Expectations

- You don't need your laptop or tablet in this class
  - All notes will be made available on the course website
  - So: please don't have your laptop open
- In-class exercises and quizzes will be done on paper
- If you need a notetaker, class recordings, etc let me know

AI

No AI support should be used in this course.

- No copilot
  - Struggling is what makes you learn
  - No struggle = no learning

AI

- No chatgpt
  - Replaces learning how to read code
  - Replaces learning how to read documentation
  - Replaces connecting with peers
  - Replaces connecting with faculty

AI

- AI will deskill you and isolate you
  - And sell you basic competence on a subscription basis
- Corporations are dumping hundreds of billions into it
  - Only to earn millions
  - Rationale? They want to tank wages

About Python

- Widely used in sciences, web publishing, other areas
- First released ca. 1994
- Relatively simple syntax

Running Python Code

- Python code is typically in a text file with a `.py` suffix, e.g. `test.py`
- You can run it from the command line: `python test.py`
- Or run the Python interpreter interactively with the `python` command

Values

- Programs operate on input *values* to produce outputs
- Values are things over which computations can be defined
- Values come in many types; here are a few:

Values: Numbers

- Numbers in Python can be integers like `5` or `47` or `-12`
- Or they can be floating point numbers (floats) like `3.14` or `0.0` or `-1.230321`.

Working with Numbers

- What can we do with numbers?
  - Compare them (e.g., `4 < 10`)
  - Do arithmetic (`4 * 2.5 + 12`)
  - Some funkier arithmetic (`4.5 // 2`, `19 % 3`)

Values: Strings

- *Strings* are sequences of *characters*—letters, numbers, or other symbols
  - We can write them with single or double quotes
- `"Hello"`, `'This is a string'`, etc

Working with Strings

- We will learn more about strings in a couple of weeks
- We can mash strings together: `'hello' + ' world!'` → `'hello world!'`
- We can make strings from other things: `str(47)` → `'47'`
- We can make numbers out of strings: `int("10")` → `10`
- We *cannot* add numbers and strings: `'my number is ' + 47` produces an error

Expressions

- We've already seen expressions
- Just like in arithmetic, we can use parentheses to group expressions:
  - `(2 + 7) * 5` is different from `2 + 7 * 5`
- Expressions work on values to produce new values

Exercise

Write Python expressions to:

- Assemble a sentence from the pieces “I”, “tolerate”, and “Python!”
- Convert the temperature 70 degrees Fahrenheit to Celsius
  - (Subtract 32 and multiply by 5/9)

Learning Communities

- Each week you'll meet with the same group
  - Including a dedicated TA
- Get started on homework, trade notes
- Set aside time to work on assignment

Availability

Let's figure out who's in what group.

Find a group of 5 with a time Thursday/Friday that works for you.

Your First Assignment

- Assignments are all on the course website
- Always issued on a Tuesday and due on Tuesday night
- Let's go over the first one now

Quiz

Variables

- We can do arithmetic in Python now
  - What about algebra?
- In algebra, we often use *names* to refer to values
  - In fiction, essays, and informal language, we do the same
- Python *variables* work like pronouns
  - They can refer to different values at different times

Defining Variables

```
my_number = 47
their_number = 2
```

Once we have defined a variable we can use it anywhere we could use a value:

```
x = my_number + their_number
y = my_number * their_number
```

What will the values of `x` and `y` be?

Variables Can Vary

```
output = 0
output = output + 10
output = output * 2
```

What will the value of `output` be?

Variables Are Independent

```
a = 0
b = a
a = 10
```

What value will `a` and `b` have?

Exercise

Rewrite this Python expression to be more legible using variables.

```
sqrt((5-3)*(5-3) + (10-12)*(10-12))
```