

The background is a solid pink color. It is decorated with various hand-drawn geometric shapes in white and black. These include a dashed line in the top left, a white triangle in the top center, a black zigzag line in the top right, a white circle in the top right, two parallel black lines in the top right, a white triangle in the top right, a black circle in the bottom right, a white circle in the bottom right, a black plus sign in the bottom left, a white triangle in the bottom center, a black circle in the bottom center, and a black plus sign in the bottom left.

Welcome!

We'll get started shortly ...



CS 49 Section


Week 4

Surajit A Bose





Agenda

- Logistics and check-ins
 - Review of lecture concepts
 - Variables
 - Casting variables
 - Console, `input()` and `print()`
 - Problems
 - [Tiny Mad Libs](#)
 - [Squaring a number](#)
- 

The background is a solid pink color. It is decorated with various white and black line art elements. In the top left, there are two parallel black diagonal lines, a dashed black line, a solid black zigzag line, a dashed black arc, and a black plus sign. In the top right, there is a solid white zigzag line, a dashed black arc, a white triangle, a black plus sign, and a black 'C' shape. In the bottom left, there is a thick white brushstroke. In the bottom center, there is a black plus sign and a black double-arch shape. In the bottom right, there is a white semi-circle with vertical lines inside it.

Logistics



Polls




- Please fill out the anonymous Zoom poll about the time this class takes, including watching videos, reading the textbook, and working through the problems!
- Please keep an eye out for another anonymous Google survey asking how section can be more useful for you.






Quick Check-in

Let's quickly go round the room! Pick any one of the following to complete the sentence: As the weeks go by, this class is getting:

- easier, because ...
 - more difficult, because
 - more fun, because ...
 - more stressful, because ...
- 



How to get hold of me / get help+

- The [class forum](#) or [section forum](#), 24 hr turnaround
 - Feel free not only to ask, but also to answer questions there!
 - Surajit's office hours:
 - Tuesdays 1p–2p on [Zoom](#)
 - By appointment on Zoom or on campus
 - [Lane's office hours](#)
 - Canvas inbox for Lane or Surajit
 - Email bozesurajit@fhda.edu, 24 hr turnaround
 - [Online](#) or [in-person](#) tutoring via the STEM center (Room 4213)
 - The section [GitHub repo](#) has lecture and section slides and solutions
- 

Any Questions?




Lecture Review: Variables






Variables

- A **named** place in memory that holds a **value** of a particular **type**
 - A variable is a **location in memory**
 - Name, value, and type are the three key characteristics of a variable
 - The variable **is** or **has** a **name**. The variable name is an identifier or tag that specifies the memory location
 - The variable **has** or **holds** a **value**, such as 8.04, -93, or "steve@apple.com"
 - The value **is of** or **has** a **type**, such as **float**, **int**, or **str**
 - Let's explore each of name, value, and type in the next few slides
- 



Variables: Names

- A **named** place in memory that holds a **value** of a particular **type**
 - Names:
 - Are case-sensitive: **cumulative_GPA** vs **cumulative_gpa**
 - Must begin with a letter or underscore
 - Must not be a reserved word such as **for** or **def**
 - Should not replicate names for built-in functions like **print()**
 - Should be in **snake_case** if more than one word long
 - Should be short but descriptive
 - "Must" indicates what is enforced by Python
 - "Should" indicates best practices
- 

Variables: Names

- Which of the following variable names meet the specified standards?
 - Must begin with a letter or underscore¹
 - Must not be a reserved word such as **for** or **def**¹
 - Should not replicate names for built-in functions like **print()**²
 - Should be in **snake_case** if more than one word long³
 - Should be short but descriptive³
- ¹illegal in Python to violate this; ²legal but highly inadvisable;
³recommended by convention

result	101_dalmatians	num_students	pass	input
numStudents	longitude	y	total	main
				1atitude

Variables: Names

- Which of the following variable names meet the specified standards?
 - Must begin with a letter or underscore
 - Must not be a reserved word such as **for** or **def**
 - Should not replicate names for built-in functions like `print()`
 - Should be in **snake_case** if more than one word long
 - Should be short but descriptive
- **red** : illegal in Python to violate this, **purple** : legal but highly inadvisable, **yellow** : legal but against convention, **green** : legal

result **101_dalmatians** **num_students** **pass** **input**
numStudents **longitude** **y** **total** **main** **1atitude**

Variables: Value

- A **named** place in memory that holds a **value** of a particular **type**
- Value:
 - Assigned with the equals sign, e.g. **answer = 42**
 - Can be the result of an expression, e.g.
gpa = qual_points / num_credits
 - The right hand side of the equals sign is **evaluated** , then the result is placed into the variable on the left hand side
 - This means we can have commands like
balance = balance + interest

Variables: Type

- A **named** place in memory that holds a **value** of a particular **type**
- Primitive types:
 - **int**, for numbers without a decimal point ("How many?"), e.g. -3
 - **float**, for numbers with a decimal point ("How much?"), e.g. 3.14159
 - **str**, for text characters including letters, numerals, punctuation, etc.
 - **bool**, for two specific values **True** and **False**
- What are the types of the following values? Some types might not be determinable from just the information given. And remember Karel!

```
35    qual_points / credits    "front_is_clear()"    0.0  
front_is_clear()    '8 + 11'    wage_rate * hours_worked
```

Variables: Type

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- Primitive types:
 - **int**, for numbers without a decimal point ("How many?"), e.g. -3
 - **float**, for numbers with a decimal point ("How much?"), e.g. 3.14159
 - **str**, for text characters including letters, numerals, punctuation, etc.
 - **bool**, for two specific values **True** and **False**
- What are the types of the following values? **red** : string, **green** : int, **purple** : float, **magenta** : bool, **yellow** : indeterminate

```
35    qual_points / credits    "front_is_clear()"    0.0
front_is_clear()    '8 + 11'    wage_rate * hours_worked
```


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Any Questions?



Lecture Review: Type Casting






Type casting

- A value of one type can be changed into a value of another type
- This is called type casting
- Given `int_val = 3`, what would the results be of the following cast operations?

```
float_val = float(int_val)
str_val = str(int_val)
str_float_val = str(float_val)
int_val_2 = int(str_float_val)
```

```
e = 2.7183
int_e = int(e)
```



Type casting

- A value of one type can be changed into a value of another type
- This is called type casting
- What would the results be of the following cast operations?

```
int_val = 3
float_val = float(int_val)           # result: 3.0
str_val = str(int_val)               # result: '3'
str_float_val = str(float_val)       # result: '3.0'
int_val_2 = int(str_float_val)       # result: error!
```

```
e = 2.7183
int_e = int(e)                       # result: 2
```



Lecture Review: Console I/O




The console, aka the terminal +

Terminal

%



The console, aka the terminal +

- Where a Python program displays its output (via the `print()` function)
 - Where the program gets its user input (via the `input()` function)
 - Console input and output is always in the form of strings
 - Anything printed to the console must be a string
 - Any variable must be cast into the appropriate type before outputting it, e.g., an **int** must be cast into its **str** representation
 - Anything brought into the program from the console will be a string
 - Any variable from console input must be cast into the appropriate type such as **int** or **float** before it can be used in the program
- 



Printing to the console: old style +

Two somewhat outmoded ways of printing to the console (i.e., of constructing a string to send to the screen):

- String concatenation, need to cast variables to **str** and include spaces
`print('I have ' + str(num_classes) + ' classes this quarter')`
- Commas, will automatically cast variables and add spaces
`print('I have', num_classes, 'classes this quarter')`

These are fine, but the cool kids have moved on to ...






Printing to the console: f-strings

... **format strings**, aka f-strings.

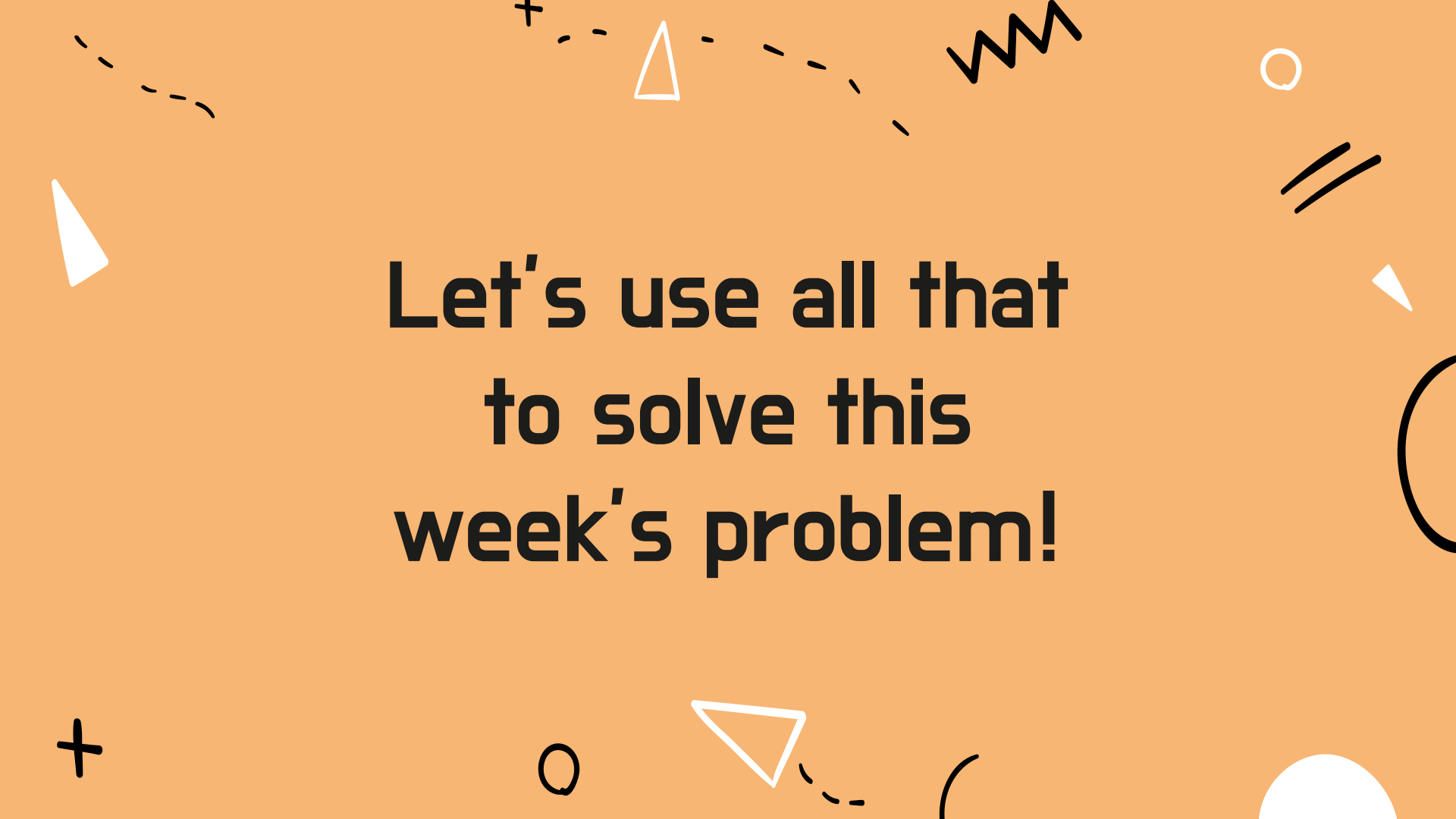
```
print(f'I have {num_classes} classes this quarter')
```

- Put the letter **f** before the open quotation mark
- Put all variable names in braces
- Python will cast all variables to string

These are all ways of constructing a new string by putting together various elements such as smaller strings or variables cast to string.



Any Questions?

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**Let's use all that
to solve this
week's problem!**



Section problem 1: Tiny Mad Libs

<https://codeinplace.stanford.edu/foothill-cs49/ide/a/tinymadlibs>



Tiny Mad Libs

Write a program which prompts the user for an adjective, then a noun, then a verb, and then prints a fun sentence with those words!

Mad Libs is a word game where players are prompted for one word at a time, and the words are eventually filled into the blanks of a word template to make an entertaining story! We've provided you with the beginning of a sentence (the `sentence_start` variable) which will end in a user-inputted adjective, noun, and then verb.



Here's a sample run (user input is in bold italics):

Please type an adjective and press enter. ***tiny***

Please type a noun and press enter. ***plant***

Please type a verb and press enter. ***fly***

CS49 is fun. I learned to program and used Python to make my tiny plant fly!



Section problem 2: Square Number

<https://codeinplace.stanford.edu/foothill-cs49/ide/a/squarenum>



Square Number

+



Ask the user for a number and print its square (the product of the number times itself).

Here's a sample run of the program (user input is in bold italics):

Type a number to see its square: ***4***

4.0 squared is 16.0



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That's all, folks!

Next up: Expressions!