

# GETTING STARTED; VARIABLES

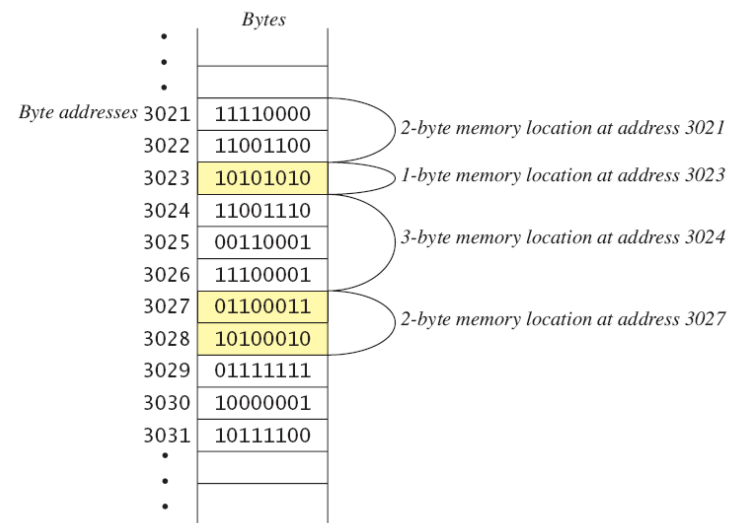
---

# Outline

- Variables
  - What is a Variable?
  - Variable Names
  - Working with Variables
  - Different Types of Variables
    - Simple Data Types
- Comments

# Variables: What is a Variable?

- *Variables* store data such as numbers and letters.
  - Think of them as places to store data.
  - They are implemented as memory locations.
- The data stored in a variable is called its *value*.
  - The value is stored in the memory location.
- Its value can be changed



# Variables: Variable Names

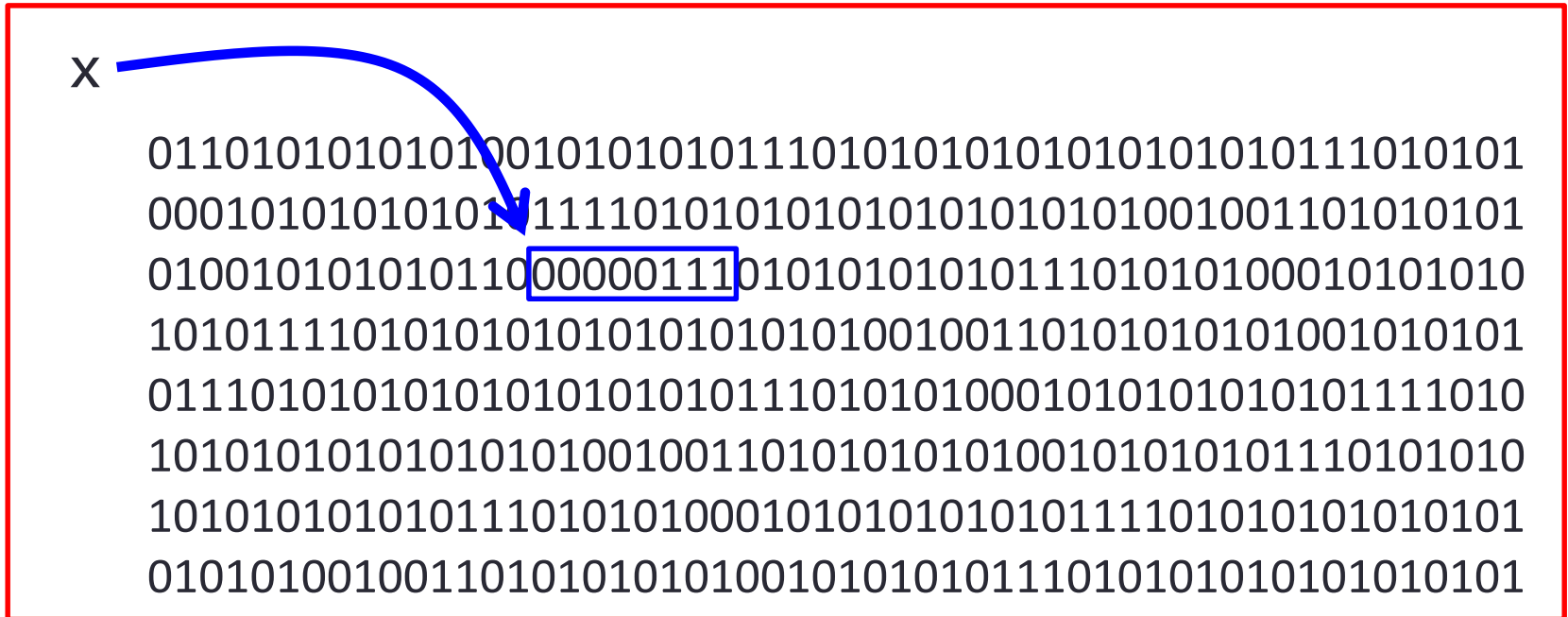
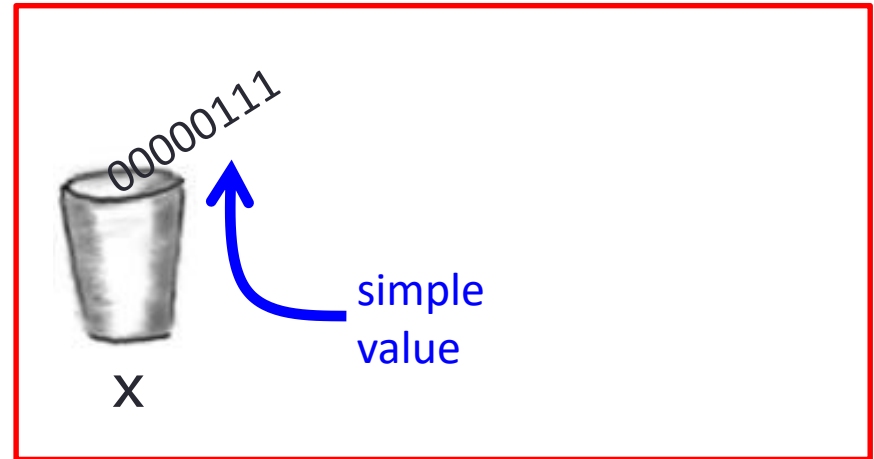
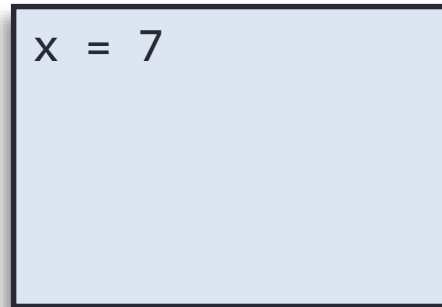


- A variable's name should suggest its use
  - e.g. **taxRate**, **count**, **sum**, etc.
  - That is, it should be meaningful
- Variable names can only contain letters, numbers and underscores
  - That means no spaces or punctuation characters.
  - The name must begin with a letter
  - You shouldn't use python keywords ("print" would not be a good name for a variable)
  - Python is case sensitive, so x and X are different variables
- One convention "lower camel case"
  - Begin with a lower case letter and then each new word is upper case
  - For example, totalWidgets

# Variables: Working with Variables

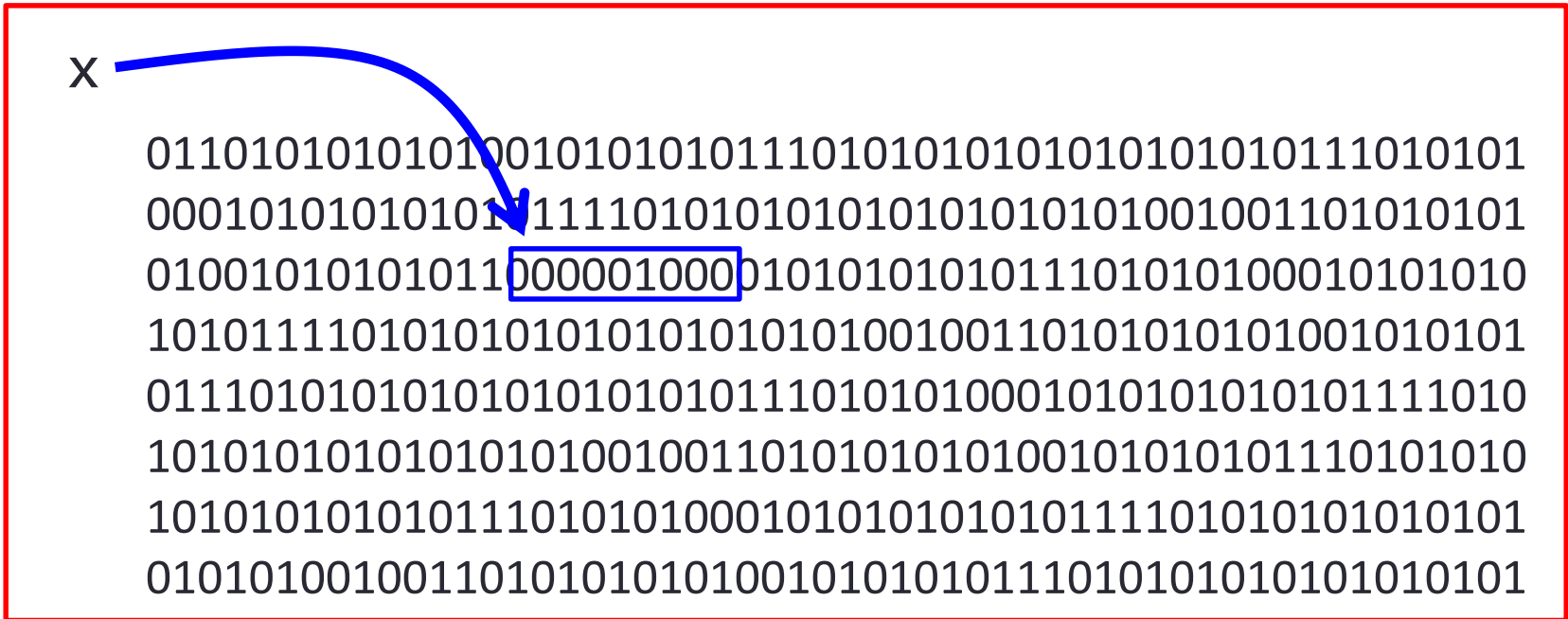
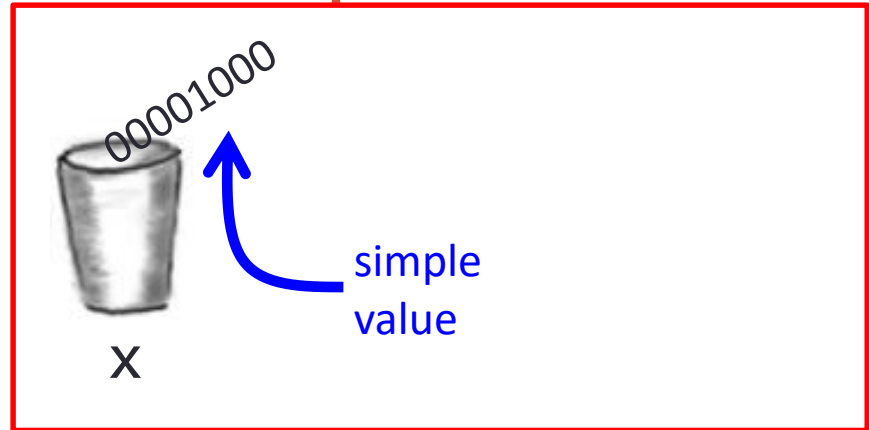
- To create a variable, simply name it and assign a value to it:
  - >>> myName = "Michele"
    - The Idle editor (or shell) will highlight text in green
  - >>> count = 0
    - There is no color highlighting here...
- Once you've created a variable, you can change its value:
  - >>> myName = "Rufus"
    - myName now has a different value
  - >>> count = count + 1
    - What?!? Is that legal?

# Creating and Initializing a Simple Variable



# Changing the Value of a Simple Variable

```
x = 7  
x = x + 1
```



# Variables: Different Types

- Simple Data Types

- Strings
  - Represent text
- Numbers
  - Integers and floating point number
    - Integers have no decimal point – they are whole numbers (e.g. 10)
    - Floating point numbers do have a decimal point (e.g. 3.1415)
- Booleans
  - Logical data type
    - Either True or False

- You can find the type of a variable in the Python Idle shell by using the “type” command:

```
>>> x = 10
>>> type(x)
<class 'int'>
```



# Data Types: Constants

- Sometimes you have a value that should not change
  - e.g. pi, my favorite number, the speed of light
- Values that shouldn't change are called *constants*.
- Floating-point constants can be written
  - With digits after a decimal point or
  - Using *e notation*.
- Naming convention
  - All upper case, use `_` between words

```
>>> SPEED_LIGHT = 3.0e8
```



# Variables and Data Types

- Variables
  - **Stores information** your program needs
  - Each has a **unique name**
  - Each has a specific **type** that Python infers

Python simple type	what it stores	example values	operations
<b>int</b>	integer values	42 1234	add, subtract, multiply, divide, remainder, compare, increment, decrement
<b>float</b>	floating-point values	9.95 3.0e8	add, subtract, multiply, divide, remainder, compare
<b>str</b>	sequence of characters	"Hello world!" 'I love this!'	concatenate, and more
<b>bool</b>	truth values	True False	and, or, not

# Changing the Data Type

- You can't do math with text
  - Input comes in as text
  - To change a text variable, say x, to an integer:  

```
>>> int(x)
```
  - To change a text variable, say x, to a floating point number:  

```
>>> float(x)
```
  - Can we change x to a boolean?  

```
>>> bool(x)
```

Sure! (Results may be surprising, though)
  - Can we change a number to text?  

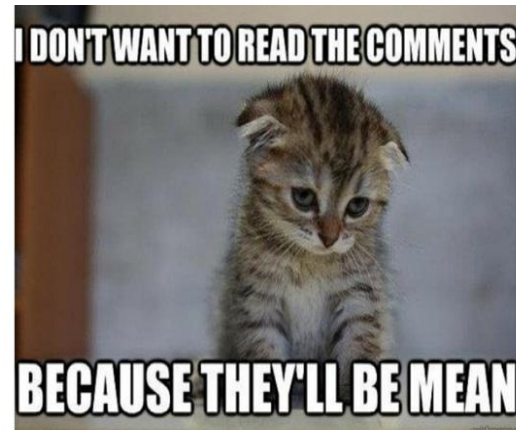
```
>>> str(10)
```

# Comments

- The best programs are self-documenting.
  - Clean style
  - Well-chosen names
- Comments are written into a program as needed to explain the program.
  - They are useful to the programmer, but they are ignored by the compiler.
  - You must always include a header comment with your name and a short description of the program

## # comment to end of line

- The Idle editor will highlight these in red



# Summary

- Variables
  - What is a Variable?
  - Variable Names
  - Working with Variables
  - Different Types of Variables
    - Simple Data Types
- Comments



# Your Turn

- Open the Idle shell and try the following commands interactively:

```
thisClass = "CSCI 135"  
type(thisClass)  
thisClass
```

```
count = 0  
type(count)  
count = count + 1  
count
```

```
isOK = True  
type(isOK)  
int(isOK)
```

```
str(isOK)  
str(count)  
int(thisClass)
```

```
count = count + 0.5  
type(count)  
count
```

On normal “Your Turn” class assignments, I would have you turn in your work to Moodle for extra credit. For this one, there is nothing to turn in – I just want you to experiment with different data types and variables in the Python shell.

# why do you think this was the answer?

# makes sense, right?

# your knew that would happen, didn't you?

# did the type change from what it was before?