Objectives

- Wrap up indefinite loops
- Text processing, manipulation
  - String operations, processing, methods
- Broader Issue: Autonomous Vehicles

Review

- From wayback: What is an API?
- How do we write indefinite loops in Python?
  - Why are they called *indefinite* loops?
- What are two ways to think about `while` loops?
  - What questions should you ask and how do the answers inform your solutions to these problems?
- Which are more powerful: `for` loops or `while` loops?
  - Why?
- Work on the consecutive flips problem (last problem on handouts from last class)
  - What information do we need to model/represent/keep track of?
  - What other questions are you considering?

Flipping Coins

- Problem: How many flips does it take to get 3 consecutive heads?
  - How can we simulate flipping a coin?
- `game` module
  - `flip_coin()` returns constant `HEADS` or `TAILS`
- Now:
  - Write solution using sentinel design pattern
  - Write solution using a `while True` loop and `break`

TEXT PROCESSING

Motivation: Text Processing

- Mostly focused on numbers so far
  - A little on graphics
- We can manipulate text to do useful work
  - Search: finding most relevant documents to a query
  - Understanding language
  - Analyzing web logs (who is looking at my web page?)
  - Many, many others
- **Today's Focus**: the `str` data type and what you can do with them

Strings: `str`

- Used for text
- Indicated by double quotes "" or single quotes ''
  - In general, I'll use double quotes
  - Empty string: "" or ''
- Use triple quotes """ for strings that go across multiple lines

```
"""This string
is long.
Like, really, really long"""
```

STRING OPERATIONS

String Operations

Operand	Syntax	Meaning
+	`str1 + str2`	Concatenate two strings into one string
*	`str * num`	Concatenate string `num` times

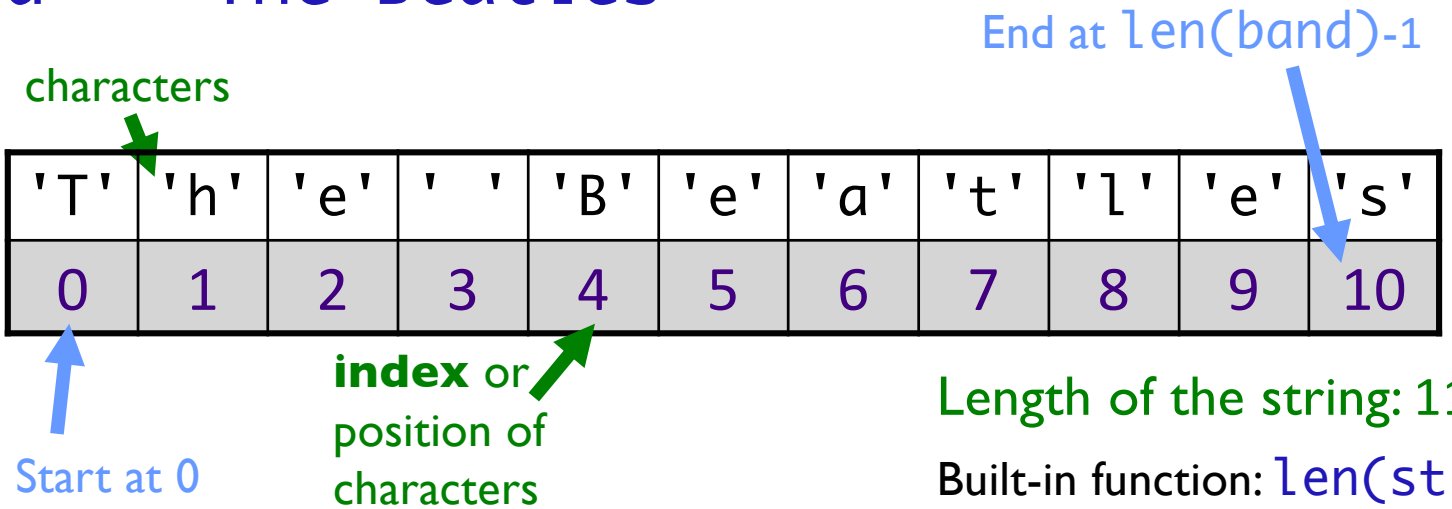
- Examples:
  - `"I feel " + "sleepy"`
    - Evaluates to `"I feel sleepy"`
  - `"Oops! " * 3`
    - Evaluates to `"Oops! Oops! Oops! "`

Recall lab 0

Strings

- A *sequence* of one-character strings
  - Example:

```
band = "The Beatles"
```



Index Operator: []

Literally, **not** optional

- Look at a particular character in the string
  - Syntax: `string[<integer_expression>]`
  - [Positive value]: index of character
  - [Negative value]: count backwards from end
- Examples:
  - `<sequence>[0]` returns the first element/char
  - `<sequence>[-1]` returns the last element/char

We will deal with sequences beyond strings later.

Examples in interpreter

Index Operator: []

- Look at a particular character in the string
  - Syntax: `string[<integer_expression>]`
- Examples with `band = "The Beatles"`

Expression	Result
`band[0]`	
`band[3]`	
`band[len(band)]`	
`band[len(band)-1]`	
`band[-1]`	

Index Operator: []

- Look at a particular character in the string
  - Syntax: `string[<integer_expression>]`
- Examples with `band = "The Beatles"`

First thing you should do:

T	h	e		B	e	a	t	l	e	s
0	1	2	3	4	5	6	7	8	9	10

Expression	Result
`band[0]`	
`band[3]`	
`band[len(band)]`	
`band[len(band)-1]`	
`band[-1]`	

Index Operator: []

- Look at a particular character in the string
  - Syntax: `string[<integer_expression>]`
- Examples with `band = "The Beatles"`

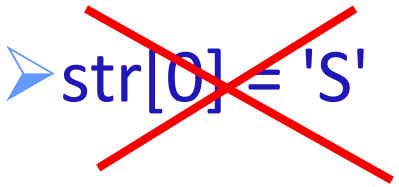
T	h	e		B	e	a	t	l	e	s
0	1	2	3	4	5	6	7	8	9	10

Expression	Result
`band[0]`	`"T"`
`band[3]`	`" "`
`band[len(band)]`	`IndexError`
`band[len(band)-1]`	`"s"`
`band[-1]`	`"s"`

Strings are Immutable

You cannot change the value of strings

- For example, you **cannot** change a character in a string



Broader Issue Groups

Pod 1	Pod 2	Pod 3	Pod 4	Pod 5
Cheng Jaz Julia Renee	Abrar Caleb Juyoung Rowen	Berkley Ilaria Ruoan Sam	Brett Devin Hudson Wesley	Ben Rosen Ben Teague Brielle Liliane

Introduce yourselves

Broader Issue: Autonomous Vehicles

- Why do I still assign an article from 2007?
- Autonomous Vehicles: love 'em or loathe 'em
  - As a passenger? As a driver (or passenger) in another car? As a pedestrian?
- What are the tradeoffs of autonomous vehicles?
  - What guarantees about the cars would you want from the company/government?
  - Are there situations that would be particularly difficult for software to handle that a person would be better equipped to handle?
    - What about the ethics of tough decisions?
- Consider the development process to create autonomous vehicles
  - What are the steps? What makes it hard?

Looking Ahead: After Break

- Lab 6 Prep Assignment: Tuesday
- Lab 6
  - Indefinite loops
  - Strings