

6.189 - Intro to Python
IAP 2008 - Class 4
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Lab 6: Tuples and Strings

Problem 1 – Collision detection of balls

Many games have complex physics engines, and one major function of these engines is to figure out if two objects are colliding. Weirdly-shaped objects are often approximated as balls. In this problem, we will figure out if two balls are colliding.

We will think in 2D to simplify things, though 3D isn't different conceptually. For calculating collision, we only care about a ball's position in space and its size. We can store position with its center x-y coordinates, and we can use its radius for size. So a ball is a tuple of **(x, y, r)**.

To figure out if two balls are colliding, we need to compute the distance between their centers, then see if this distance is *less* than the sum of their radii. If so, they are colliding.

Write a function that takes two balls and computes if they are colliding. Then call the function with two sets of balls. The first set is (0, 0, 1) and (3, 3, 1); these should not be colliding. The second set is (5, 5, 2) and (2, 8, 3); these should be colliding.

Problem 2 – Pig-Latin Converter

Write a program that lets the user enter in some English text, then converts the text to Pig-Latin. To review, Pig-Latin takes the first letter of a word, puts it at the end, and appends "ay". The only exception is if the first letter is a vowel, in which case we keep it as it is and append "hay" to the end.

E.g. "hello" → "ellohay", and "image" → "imagehay"

It will be useful to define a list or tuple at the top called **VOWELS**. This way, you can check if a letter x is a vowel with the expression **x in VOWELS**.

It's tricky for us to deal with punctuation and numbers with what we know so far, so instead, ask the user to enter only words and spaces. You can convert their input from a string to a list of strings by calling **split** on the string:

```
"My name is John Smith".split(" ") → ["My", "name", "is", "John", "Smith"]
```

Using this list, you can go through each word and convert it to Pig-Latin. Also, to get a word except for the first letter, you can use **word[1:]**.

Hints: It will make your life much easier – and your code much better – if you separate tasks into functions, e.g. have a function that converts one word to Pig-Latin rather than putting it into your main program code.