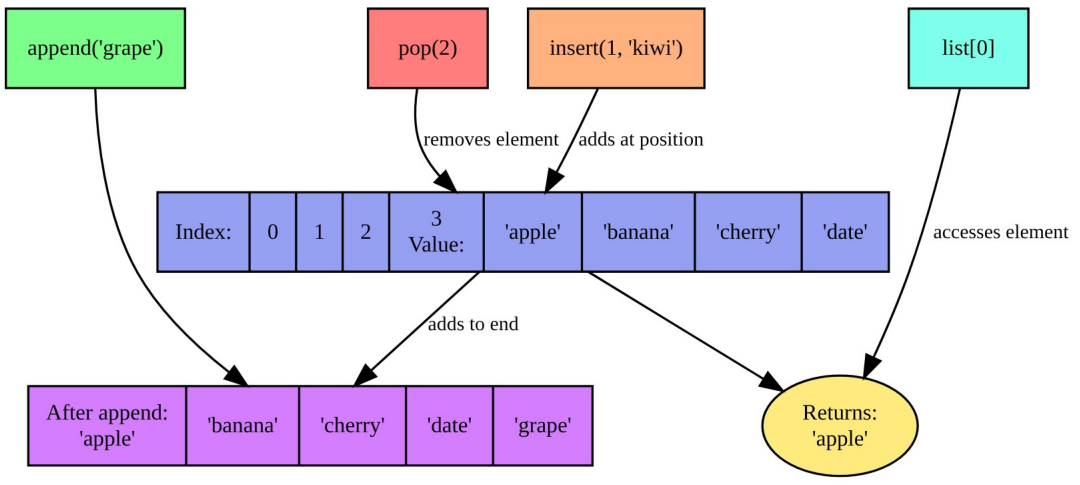
Name: _____ Date: _____

Introduction to Python Lists

What is a Python List?

A list is a fundamental Python data structure that holds an ordered collection of items. Think of it like a shopping list where the order matters!

- **Syntax:** Created with square brackets: `*colors = ["red", "blue"]*`
- **Mutable:** You can change, add, and remove items after it's created.
- **Indexing:** Access items by their position, starting at 0. `*colors[0]*` returns *"red"*.



A visual guide to list structure and common operations. Note how each item has a unique index.

Common List Methods: Your Turn!

Describe the following list methods in your own words and provide a simple code example for each.

Method	Description (In your own words)	Example
`.append()`		
`.insert()`		
`.pop()`		
`len()`		

Get Ready to Code!

On the next pages, you will use these concepts to build and compare your own lists in Python. Pay close attention to how you might implement a custom list comparison function.

Coding Challenge: The *find_greatest()* Function

10 Points

Step-by-Step Approach

1. **Initialize**: Create a variable, let's call it `greatest_num`, and set it to the first number in the input list.

2. **Iterate**: Loop through each number in the list, starting from the second number.

3. **Compare**: In each loop, compare the current number with `greatest_num`.

4. **Update**: If the current number is larger, update the value of `greatest_num`.

5. **Return**: After the loop finishes, return the final value of `greatest_num`.

Your Task: Implement the Function

In the space below, define a function `find_greatest(numbers_list)`.
• It must accept a list of numbers.
• It must **not** use the built-in `max()` function.
• It must include a proper docstring explaining what it does.

Test Your Code (Optional)

Verify your function with a few test cases. Write down your test calls and the results you get.
Example: `find_greatest([5, 1, 9, 3])` -> Expected: 9

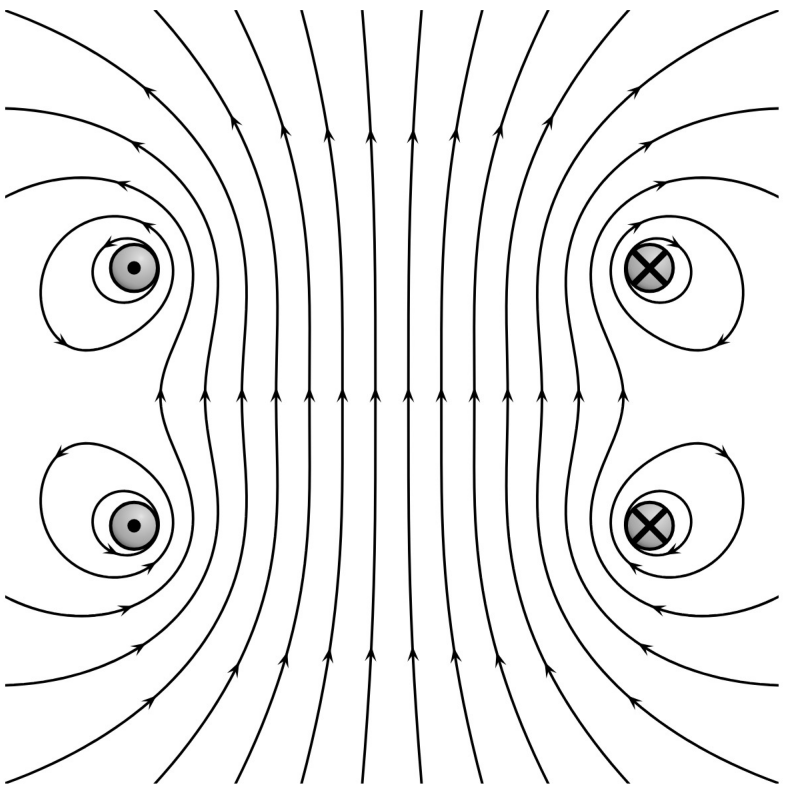


Figure 1: The symmetrical magnetic field of Helmholtz coils. Like a well-structured algorithm, physical systems often exhibit elegant and predictable design.

Practice Problems: List Manipulation

Apply your knowledge of Python lists by completing the following challenges. Write your code in the designated spaces.

1. Find the Smallest Value (5 points)

Implement the find_smallest() function. It should take a list of numbers and return the smallest value.
You are not allowed to use the built-in min() function.

2. Find the Second Greatest (5 points)

Implement find_second_greatest(). Given a list of numbers, this function should return the second largest number. The list may contain duplicates.

3. Get Max Scores from Nested Lists (5 points)

Implement get_max_scores(). This function takes a list of (name, score) tuples where names can appear multiple times. Return a dictionary where each name is a key and their highest score is the value.

Example Input: [('Alice', 88), ('Bob', 92), ('Alice', 95)]
Example Output: {'Alice': 95, 'Bob': 92}