INFO5002: Intro to Python for Info Sys

Debugging

Northeastern University

Slides created by: Zachary Doucet

We make mistakes

- In fact the first time you write code there will be problems.
- These bugs, we need a way to hunt them down.
- Debugging!

2 Main Techniques

1) Validating intermediate variables states with printing.

2) Using purpose built debugger.

Printing

- Sometimes printing the state of variables at a given moment can help spot bugs.

```
def find_largest(numbers):
    largest = 0
    for num in numbers:
        if num > largest:
            largest = num
    return largest

# Test case
print(find_largest([-10, -5, -20]))
```

0

Adding print statements

```python
def find_largest(numbers):
    largest = 0
    print("Initial largest:", largest)
    for num in numbers:
        print("Checking number:", num)
        if num > largest:
            print(f"{num} is greater
             than {largest} → updating largest")
            largest = num
        else:
            print(f"{num} is not greater than {largest}")
    return largest

# Test case
print("Result:", find_largest([-10, -5, -20]))
```

```
Initial largest: 0
Checking number: -10
-10 is not greater
than 0
Checking number: -5
-5 is not greater
than 0
Checking number: -20
-20 is not greater
than 0
Result: 0
```

Using Python pdb

```python
def find_largest(numbers):
    largest = 0
    for num in numbers:
        breakpoint()
        if num > largest:
            largest = num
    return largest


# Test case
print(find_largest([-10, -5, -20]))
```

```
python main.py
```

```
→ breakpoint()
(Pdb) p largest
0
(Pdb) p num
-10
(Pdb) p num > largest
False
(Pdb) n
→ if num > largest:
(Pdb) n
→ for num in numbers:
(Pdb) p num
-10
(Pdb) n
→ breakpoint()
(Pdb) p num
-5
(Pdb) n
→ if num > largest:
(Pdb) n
→ for num in numbers:
(Pdb) c
→ breakpoint()
(Pdb) p num
-20
(Pdb) c
0
```

Common debugger commands

- n (next): go to next line of current function.
- s (step): go to very next line (if function call → go inside).
- p *expression*: prints the expression (vars included).
- c (continue): go to the next breakpoint.
- And so much more you can use from the docs.
  - https://docs.python.org/3/library/pdb.html

Let’s practice

- Try to solve the bug in the following code which you can find on canvas.

```
def find_max(nums):
    max_val = nums[0]
    for i in range(1, len(nums) - 1):
        if nums[i] > max_val:
            max_val = nums[i]
    return max_val
```

And some more

```
def repeat_message(message, times):
    return message * times

msg = input("Enter a message: ")
count = input("How many times? ")
print(repeat_message(msg, count))
```

```
def sum_even(numbers):
    total = 0
    for num in numbers:
        if num % 2 == 1:
            total += num
    return total

print("Sum of even numbers:", sum_even([1, 2, 3, 4, 5, 6]))
```