Debugging

What is debugging?

Debugging is the process of identifying and removing errors from computer hardware or software. Generally this entails running a program, making small changes, and running again. These changes can be very hard to find, as many of you have experienced. When your program doesn’t run and you have looked and looked but you completely miss the fact that you excluded a single quote (’), and that is enough to have what is called a syntax error. Another error, called a runtime error, is you’re your program launches and runs, but sometime during the program running it crashes from some error. Debugging isn’t only necessary when your program doesn’t run. It often is the case where your program runs, but it does not perform as expected. This is called a logical error, and these can be some of the hardest to find and fix. In our assignment this week we will look at syntax and logical errors and try to debug a few code blocks, identify the error, and type of error.

Syntax error example:

```python
if (x >5):
    print(’Hi’)
else:
    print(’Goodbye’)
```

In the above example, the keyword ‘else’ is spelled incorrectly as ‘esle.’

Logical error example (normally mathematical or a Boolean/logic issue):

```python
width = 5
length = 3
area = length ** width
print(area)
```

In the above example, when area is calculated, the ** (power symbol) is used instead of * (multiplication), therefore the answer would end up being $3^5 = 243$, instead of $3 * 5 = 15$.

**ASSIGNMENT:** Debug the blocks of code below.

1. This program is supposed to print the numbers 1 through 10. This is a logical error, find the error and explain how to fix it(usually more than one way to fix)

```python
count = 1
while count < 10 :
    print (count)
    count = count + 1
```
2. This program is supposed to print a user’s last name, a space, and then the user’s first name. This program has 3 syntax errors, locate them

```python
firstname = input("Please enter your first name: ")
lastname = input ("Please enter your last name: ")
print (lastname + " " + firstname)
```

3. This program takes inputs of length and width of a field, and calculates how many acres the field is. Note 1 acre = 43560 feet approximately. This contains 4 syntax errors and 2 logical errors (6 total). Find at least 4 of them.

```python
sqr_ft_acre = 43560
length = int(input("Please enter length in feet: ")
width = int(input ("Please enter width in feet: "))
4total_acre = (length * width) - sqr_ft_acre
Print (sqr_ft_acre)
```

4. The program below takes in three numbers in whatever order the user chooses, reorders the numbers, and print them from least to greatest. This contains 5 syntax errors, and 4 logical errors. Find 7 of the 9 total errors.

```python
num1 = int(input("Enter a number: ")
num2 = int(input("Enter another number: ")
num2 = int(input("Enter another number: ")
smallest_num = max(num1, num2, num3)
largest_num = min(num1, num2, num3)
middle_num = (num1 + num2 + num 3) - (smallest_num - largest_num)
print(The numbers in order from least to greatest is: " + str(largest_num) + str(middle_num) + str(smallest_num))
```