Name: _____

Student ID: _____ 0

Authors' note: The following is the posttest taken by both groups in the study. It is intended to assess all 4 skills in the theory (tracing, writing correct syntax, comprehending templates, writing code with templates).

Any errors or typos in it were not corrected because they were included in the study.

Assessment

Please take the exam with no aid from outside sources (books, notes, internet, etc.).

1) What is printed as a result of this code segment?

```
x = 2
y = 5
z = 3

if (y % x == 0):
    if (y >= z):
        print("a")
        x = x * x;
    else:
        print("b")
        z = z * z;
else:
    print("c")
    if (z >= x):
        print("d")
        if (y >= z):
            print("e")
            y = y * y;
    else:
        print("f")
        z = z * z;

if (y % x == 0):
    print("g")
    x = x + 3;
else:
    y = y * 2;
    print("h")

print(x)
print(y)
print(z)
```

Output

E1. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

2) Consider the following code segment.

```
name = "james"
time = "night"

if(time != "day"):
    if (name == "Alice"):
        print("good night alice")
    else:
        print("good night")
        print("name")
    print("ok")
else:
    print("good day to you")
print("done")
```

After the above code is executed, what is the output? Write the output in the box below:

E2. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

3) The code below assumes that the variables `a`, `b`, and `c` all store numbers (integers or floats).

```
x = -1
y = -1

if(a<b and a<c):
    print(1)
    x = a
elif(b<c):
    print(2)
    x = b
else:
    print(3)
    x = c

if(a>b and a>c):
    print(4)
    y = a
elif(b>c):
    print(5)
    y = b
else:
    print(6)
    y = c

output = y - x

if(output > 0):
    print("OUTPUT:")
    print(output)
```

A) **Given the variable values `a = 1.1, b = 5, c = 2`, determine the output of the code and write the output in the box below:**

B) **In the box below, summarize in plain English what the code does.**

C) **Under what conditions would nothing be printed?**

Initial here after reading page: _____

E3. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

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4) The code below assumes that the variables `a`, `b`, and `c` all store integers.

```
x = a%2==0
y = b%2==0
z = c%2==0

u = 0

if(x):
  u = u + 1
if(y):
  u = u + 1
if(z):
  u = u + 1

print(u)
```

A) **Given the variable values `a = -2, b = 3, c = 4`, determine the output of the code and write the output in the box below:**

B) **In the box below, summarize in plain English what the code does.**

C) **Under what conditions would `0` be printed?**

E4. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

5) Two friends regularly play chess against each other and they want to keep track of who was the last person to the win and how many previous games in a row they won. To do so, they ask you write some code to help them.

Predefined Variables

Four variables have already been defined:

- The variable `leader` has the name of the person who won the previous game(s).
- The variable `follower` contains the name of the person who lost the previous game.
- The variable `current_streak` contains the number of consecutive games that have been won by `leader`.
- The variable `winner` contains the name of the person who just won a game.

Code Instructions

They ask you to write code to do the following:

1. If `winner` is equal to `follower`, then there is a new champion.
    a. Swap the names stored in `leader` and `follower` to reflect this change.
    b. Reset `current_streak` to 0.
    c. Print "`new leader`"
2. If `winner` is equal to `leader`, then the person who won the previous game has won another one
    a. Update `current_streak` by adding `1` to the previous value.
    b. Print "`same leader`"
3. If `winner` is not equal to `follower` or `leader`, then there is an unknown player.
    a. Print "`unknown player`"

Example Execution

Here are a few examples of what how the code would execute:

- If the variable `winner` was set to "`Luca`" and the variable `follower` was also set to "`Luca`", the values stored in `leader` and `follower` would swap, `current_streak` would be set to `0`, and "`new leader`" would be printed.
- If the variable `winner` was set to "`Jillian`", the variable `leader` was also set to "`Jillian`", and the variable `current_streak` were set to `4`, then `current_streak` would be updated to `5` and "`same leader`" would be printed.
- If the variable `winner` was set to "`Hugh`", the variable `leader` was set to "`Juan`", and the variable `follower` were set to "`Olaf`", then "`unknown player`" would be printed.

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A) Write code following the numbered steps in the previous page. Assume the variables `leader`, `follower`, `current_streak`, and `winner` have already been defined.

B) **Go back over your code and write a comment explaining what each line of code does**

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E5. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

6) You and a few friends go out to eat at a restaurant and decide to split the bill and pay in bitcoin. The meal costs each of you a small fraction of bitcoin. You want to write code 1) determine how much each person owes and 2) ensure that you all have paid the bill off.

First, you want to know how much each of you owe. The total cost of the meal is stored in the variable `cost`. The total number of people eating is stored as a number in the variable `num_people`.

A) **Given the variables `cost` and `num_people`, write code that divides `cost` by `num_people` and stores the result in a new variable `cost_per_person`. Then print the output of the variable `cost_per_person`.**

B) **Go back over your code and write a comment explaining what each line of code does**

Say you and 2 friends (a total of 3 people) split a bill. The amounts each of you paid are decimal numbers stored in the variables `amt1`, `amt2`, and `amt3`. You want to determine if you paid within 0.000001 (1e-6) bitcoin of the bill. The cost of the meal is stored in the decimal variable `cost`. You are worried that you may have underpaid or overpaid.

Write code that determines if you and your friends properly paid for the bill.

- If in total you all paid at least 0.000001 less than the cost, your code should print "underpaid" and then the amount that you underpaid on the next line.
- If in total you all paid within 0.000001 less than the cost, your code should print "paid in full".
- If in total you all paid at least 0.000001 more than the cost, your code should print "overpaid" and then the amount you all overpaid on the following line.

In example, say
`amt1 = 0.001111`, and
`amt2 = 0.002222`, and
`amt3 = 0.000033`, and
`cost = 0.003368`.

The output of the code would be:

```
underpaid
0.000002
```

C) **In plain English, describe a step-by-step plan for solving the problem:**

D) **Write code to solve the problem:**

E) **Go back over your code and write a comment explaining what each line of code does**

Initial here after reading page: _____

E6. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7

7) Write code that determines if the variable `inp`, which has a 4 digit integer value, is a valid passcode. `inp` is a valid passcode if the sum of the first 3 digits modulus `7` is equal to the last digit. If `inp` is valid, the code should print `valid`. If the string is not valid, it should print `NOT valid`.

So if `inp` were set to `5312`, it would be a valid passcode and your code would print `valid` because the first 3 digits (`5`, `3`, and `1`) sum to `9` and `9` modulus `7` equals the last digit (`2`). `1234` would not be a valid passcode and your code would print `NOT valid`. Write your solution in the box below.

Assume a variable `inp` has already been declared and stores a 4 digit integer value.

A) **In plain English, describe a step-by-step plan for solving the problem:**

B) **Write code to solve the problem:**

C) **Go back over your code and write a comment explaining what each line of code does**

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E7. The following questions related to the previous problem.

After reading the problem statement, what did you think of first?
(If you were reminded of a construct in general or a general structure of solution, please note that.)

What was the most difficult part of this problem?

On a scale of 1-7, rate your confidence in you solution: (Circle one)

1 2 3 4 5 6 7