1 Functions

Questions

1.1 Determine what the Python interpreter will output given the following lines of code.

```python
>>> from operator import add, mul
>>> mul(add(5, 6), 8)

>>> print('x')

>>> y = print('x')

>>> print(y)

>>> print(add(4, 2), print('a'))
```

1.2 Determine what the Python interpreter will output given the following lines of code.

```python
>>> def foo(x):
...     print(x)
...     return x + 1

>>> def bar(y, x):
...     print(x - y)

>>> foo(3)

>>> bar(3)

>>> bar(6, 1)

>>> bar(foo(10), 11)
```
Functions, Control and Environments

2 Control

Questions

2.1 Which numbers will be printed after executing the following code?

```python
n = 0
if n:
    print(1)
elif n < 2:
    print(2)
else:
    print(3)
print(4)
```

2.2 WWPD (What would Python Display) after evaluating each of the following expressions?

```python
>>> 0 and 1 / 0

>>> 6 or 1 or "a" or 1 / 0

>>> 6 and 1 and "a" and 1 / 0

>>> print(print(4) and 2)

>>> not True and print("a")
```

2.3 Define a function, count_digits, which takes in an integer, n, and counts the number of digits in that number.

```python
def count_digits(n):
    ... 
    >>> count_digits(4)
    1
    >>> count_digits(12345678)
    8
    >>> count_digits(0)
    0
    ...
Define a function, `count_matches`, which takes in two integers `n` and `m`, and counts the number of digits that match.

```python
def count_matches(n, m):
    ...  
    >>> count_matches(10, 30)
    1  
    >>> count_matches(12345, 23456)
    0  
    >>> count_matches(121212, 123123)
    2  
    >>> count_matches(111, 11) # only one's place matches
    2  
    >>> count_matches(101, 10) # no place matches
    0  
    ...
```
3 Environment Diagrams

Questions

3.1 Draw the environment diagram for evaluating the following code

```python
def f(x):
    return y + x

y = 10
f(8)
```

3.2 Draw the environment diagram for evaluating the following code

```python
def dessef(a, b):
    c = a + b
    b = b + 1

b = 6
dessef(b, 4)
```
3.3 Draw the environment diagram for evaluating the following code

```python
def foo(x, y):
    foo = bar
    return foo(bar(x, x), y)

def bar(z, x):
    return z + y

y = 5
foo(1, 2)
```

3.4 Draw the environment diagram for evaluating the following code

```python
def spain(japan, iran):
    def world(cup, egypt):
        return japan-poland
    return iran(world(iran, poland))

def saudi(arabia):
    return japan + 3

japan, poland = 3, 7
spain(poland+1, saudi)
```
3.5 Draw the environment diagram for evaluating the following code

cap = 9
hulk = 3

def marvel(cap, thor, avengers):
    marvel = avengers
    iron = hulk + cap
    if thor > cap:
        def marvel(cap, thor, avengers):
            return iron
    else:
        iron = hulk
    return marvel(thor, cap, marvel)

def iron(man):
    hulk = cap - 1
    return hulk

marvel(cap, iron(3), marvel)