1. (8.0 points) What Would Python Display? 1

Assume the following code has been executed already. 2

```
one = 1
```
3

```
def choose(one):
    if big(one):
        print('A')
        if huge(one):
            print('B')
    elif big(one) or huge(one):
        print('C')
    if big(one) or print('D'):
        print('E')
    else:
        print('F')
```
4

```
big = lambda x: x >= one
huge = lambda x: x > one
```
5

```
def which():
    one = 3
    def this():
        return one
        return one + 1
    return this
    one = 4
```
6

(a) (6.0 pt) Which lines are displayed by the interactive Python interpreter after evaluating `choose(one one)`? **Select all that apply.** 7

- ☐ `A`
- ☐ `B`
- ☐ `C`
- ☐ `D`
- ☐ `E`
- ☐ `None`
- ☐ None of the above

8

(b) (2.0 pt) What is displayed by the interactive Python interpreter after evaluating `which()()`? 9

- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ A function
- ◯ An error occurs before anything is displayed

10

3. (8.0 points) Nearly Square 1

Implement `near_square`, which takes positive integer `n` and non-negative integer `k`. It returns the largest integer less than or equal to `n` which is the product of two positive integers that differ by `k` or less. You may use `solve`, which is provided. 2

```
def near_square(n, k):                                                    3
    """Return the largest integer that is less than or equal to n and
    equals a * b for some positive integers a and b where abs(a - b) <= k.

    >>> near_square(125, 0)  # 11 * 11 = 121 and abs(11 - 11) = 0
    121
    >>> near_square(120, 3)  # 10 * 12 = 120 and abs(10 - 12) = 2
    120
    >>> near_square(120, 1)  # 10 * 11 = 110 and abs(10 - 11) = 1
    110
    """
    while True:                                                           4
        gap = k                                                           5

        while _______:
                (a)
            x = _______
                  (b)
            if _______:  # Check if x is a whole number
                 (c)

                return _______
                         (d)

            _______
              (e)
    _______
      (f)

def solve(b, c):                                                          6
    """Returns the largest x for which x * (x + b) = c                    7

    >>> solve(2, 120)  # x=10 solves x * (x + 2) = 120
    10.0
    >>> solve(2, 121)  # x=10.045... solves x * (x + 2) = 121
    10.045361017187261
    """
    return (b*b/4 + c) ** 0.5 - b/2
```

(a) (2.0 pt) Fill in blank (a). Select **all** that apply. 8

- ☐ `gap` 9
- ☐ `gap != 0`
- ☐ `gap > 0`
- ☐ `gap >= 0`