

1. (8.0 points) What Would Python Display?

Assume the following code has been executed already.

```
one = 1

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')
```

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

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

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

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

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

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

3. (8.0 points) Nearly Square

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.

```
def near_square(n, k):
    """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:
        gap = k
        while -----:
            (a)
            x = -----
                (b)
            if -----: # Check if x is a whole number
                (c)
            return -----
                (d)
        -----
            (e)
    -----
        (f)
```

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

    >>> 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.

- ☐ gap
- ☐ gap != 0
- ☐ gap > 0
- ☐ gap >= 0