CONTROL & ENVIRONMENTS

CS 61A GROUP MENTORING

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1 Environment Diagrams

1. When do we make a new frame in an environment diagram?

   Solution: We make a new frame in an environment diagram when calling a user-defined function, or when we are applying the operator to the operand(s). This occurs after both the operator and operand(s) are evaluated.

2. Draw the environment diagram that results from running the following code.

```
def swap(x, y):
    x, y = y, x
    return print("Swapped!", x, y)

x, y = 60, 1
a = swap(x, y)
swap(a, y)
```

   Solution: https://goo.gl/Lp90MJ

3. Draw the environment diagram that results from running the following code.

```
def funny(joke):
    hoax = joke + 1
    return funny(hoax)

def sad(joke):
    hoax = joke - 1
    return hoax + hoax

funny, sad = sad, funny
result = funny(sad(1))
```

Solution: https://goo.gl/z89He9

4. Draw the environment diagram that results from running the following code.

```
a = 1
c = 2
def b(b):
    def d():
        return b + c
    return d()
c = b(a)
a = b(c)
```

Solution: https://goo.gl/hRGc3x

2 Control

1. Write a function that returns true if a number is divisible by 4 and false otherwise.

Solution:

```
def is_divisible_by_4(num):
    return num % 4 == 0
```

2. Write a function, `is_leap_year`, that returns true if a number is a leap year and false otherwise. Recall that a *leap year* is divisible by 4 unless the year is not divisible by 400.

Solution:

```
def is_leap_year(year):
    return year % 4 == 0 and year % 400 != 0
```

3. Implement `fizzbuzz(n)`, which prints numbers from 1 to `n` (inclusive). However, for numbers divisible by 3, print "fizz". For numbers divisible by 5, print "buzz". For numbers divisible by both 3 and 5, print "fizzbuzz".

```
def fizzbuzz(n):
    """
    >>> result = fizzbuzz(16)
    1
    2
    fizz
    4
    buzz
    fizz
    7
    8
    fizz
    buzz
    11
    fizz
    13
    14
    fizzbuzz
    16
    >>> result is None
    True
    """
```

Solution:

```
    i = 1
    while i <= n:
        if i % 3 == 0 and i % 5 == 0:
            print('fizzbuzz')
        elif i % 3 == 0:
            print('fizz')
        elif i % 5 == 0:
            print('buzz')
        else:
            print(i)
        i += 1
```