Q5: If Function vs Statement

Let's try to write a function that does the same thing as an if statement.

**def** **if\_function**(condition, true\_result, false\_result):

"""Return true\_result if condition is a true value, and

false\_result otherwise.

>>> if\_function(True, 2, 3)

2

>>> if\_function(False, 2, 3)

3

>>> if\_function(3==2, 3+2, 3-2)

1

>>> if\_function(3>2, 3+2, 3-2)

5

"""

**if** condition:

**return** true\_result

**else**:

**return** false\_result

Despite the doctests above, this function actually does *not* do the same thing as an if statement in all cases. To prove this fact, write functions cond, true\_func, and false\_func such that with\_if\_statement prints the number 47, but with\_if\_function prints both 42 and 47.

**def** **with\_if\_statement**():

"""

>>> result = with\_if\_statement()

47

>>> print(result)

None

"""

**if** cond():

**return** true\_func()

**else**:

**return** false\_func()

**def** **with\_if\_function**():

"""

>>> result = with\_if\_function()

42

47

>>> print(result)

None

"""

**return** if\_function(cond(), true\_func(), false\_func())

**def** **cond**():

**return** False

**def** **true\_func**():

print(42)

**def** **false\_func**():

print(47)

**Hint**: If you are having a hard time identifying how an if statement and if\_function differ, consider the [rules of evaluation for if statements](http://composingprograms.com/pages/15-control.html#conditional-statements) and [call expressions](http://composingprograms.com/pages/12-elements-of-programming.html#call-expressions).

Use Ok to test your code:

python3 ok -q with\_if\_statement

python3 ok -q with\_if\_function

The function with\_if\_function uses a call expression, which guarantees that all of its operand subexpressions will be evaluated before if\_function is applied to the resulting arguments.

Therefore, even if cond returns False, the function true\_func will be called. When we call true\_func, we print out 42. Then, when we call false\_func, we will also print 47.

By contrast, with\_if\_statement will never call true\_func if cond returns False. Thus, we will only call false\_func, printing 47