

IT 210 – Fundamentals of Programming – Lab 9

This program requires you to work in a group of two or three to write Python code that implements a fast recursive Fibonacci with a helper function. The start code is on D2L and shown here.

```
# Your name
# Your team member name(s)

# Fibonacci Lab

# This is the standard recursive implementation of the fibonacci calculation
def fib1(n):
    global count # These first two statements are only used to count the
    count += 1 # number of recursive calls.
    if n <= 2:
        return 1
    else:
        return fib1(n-1) + fib1(n-2)

# Build the starting dictionary and then call the function that will recurse
def fibWithHelp(n):
    fibDict = {1:1,2:1}
    return fib2(n,fibDict)

# This version of fib will check to see if n is in the dictionary and if so,
# simply return the value stored there. If it is not in the dictionary,
# perform the calculation, update the dictionary and return the calculated
# value.
def fib2(n, fibDict):
    global count # These first two statements are only used to count the
    count += 1 # number of recursive calls.

    # Finish writing the code for this implementation. Ensure that you
    # use fib2 when recursing, not fib1

if __name__ == "__main__":
    for x in (3,10,25,30,35):
        count = 0
        print("fib1(%d): %d. fib1 was called %d times." % (x, fib1(x), count))
    print()
    for x in (3,10,25,30,35,100,500): # Much larger problems are possible here
        count = 0
        print("fibWithHelp(%d): %d. fib2 was called %d times." % (x, fibWithHelp(x), count))
```

The output of your program should look like this:

```
fib1(3): 2. fib1 was called 3 times.
fib1(10): 55. fib1 was called 109 times.
fib1(25): 75025. fib1 was called 150049 times.
fib1(30): 832040. fib1 was called 1664079 times.
fib1(35): 9227465. fib1 was called 18454929 times.

fibWithHelp(3): 2. fib2 was called 3 times.
fibWithHelp(10): 55. fib2 was called 17 times.
fibWithHelp(25): 75025. fib2 was called 47 times.
fibWithHelp(30): 832040. fib2 was called 57 times.
fibWithHelp(35): 9227465. fib2 was called 67 times.
fibWithHelp(100): 354224848179261915075. fib2 was called 197 times.
fibWithHelp(500): 139423224561697880139724382870407283950070256587697307264108962948325571622863290691557658876222521294125.
fib2 was called 997 times
```

Each member of the group must make a submission to D2L with your own name as a comment on line 1 and the name or names of other group members on the next line. If you do the lab solo, I will deduct 20 points. Submit a copy of the lab to the Lab 9 D2L dropbox not later than **11:59 pm Monday** evening. Name your file Lab09.py.