CS 106A Practice Diagnostic

This practice diagnostic looks very similar to what the real diagnostic will look like, both in terms of material covered and structure.

Short Answers

Parts A & B refer to the following (buggy) program:

```
“””
This program counts the number of multiples of either 3 or 5
that are less than or equal to 30 and prints this count
“””

def count_multiples(n):
      “””
      Counts the number of multiples of 3 or 5 that
      are less than or equal to n.
      “””
      counter = 0
      for i in range(1, n + 1):
            if i % 3 == 0:
                  counter += 1
            if i % 5 == 0:
                  counter += 1
       return counter

def main():
    n = 30
    count_multiples(n)

if __name__ == “__main__”:
   main()
```

A. When run, the program does not produce the desired output. Why not?

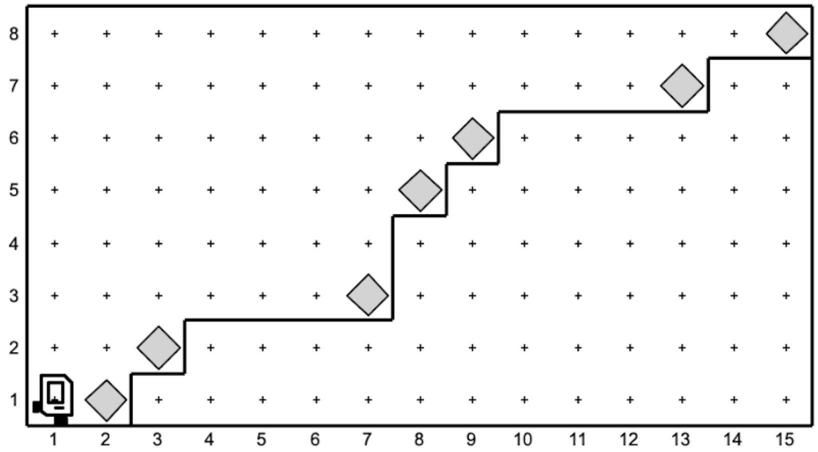
B. How can this program be fixed to print the correct number? You may change either `count_multiples` or `main`, but `count_multiples` must still implement the functionality described in its comment for all possible values of its parameter.

Short Program

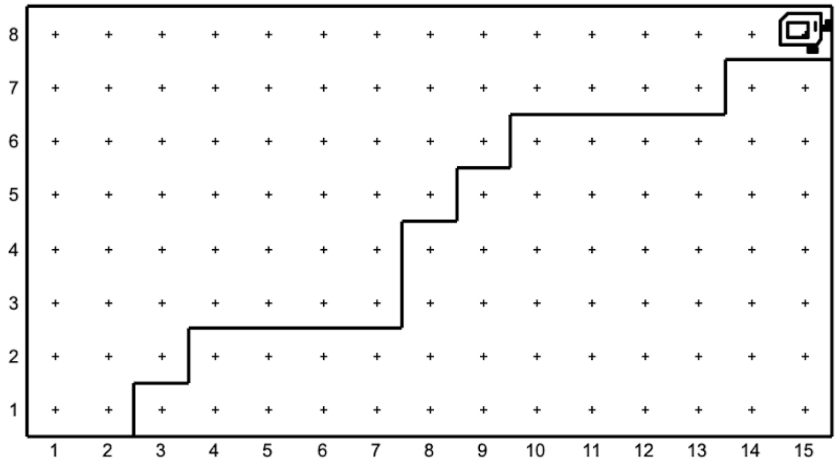
Write a program that reads in two numbers from the user and prints the larger number. You can assume the user types in two distinct real numbers.

Flower Picking Karel

Karel is standing at the base of a mountain in the spring and wants to climb it, stopping along the way to collect any flowers it comes across. Karel's world looks something like this:



The mountain consists of a series of 'steps' each of which is at least one street high and one avenue across, and flowers are represented by beepers. A flower is represented by a single beeper, and each step has a flower at its base. Karel's job is to climb this mountain, picking up the beepers along the way, to result in a world that looks like this:



Write a program to help Karel do this. Keep in mind the following considerations:

- Your program should work for any world and any sized steps.
- The peak of the mountain is guaranteed to be at the top right corner of the world.
- Karel begins at (1,1) facing East.

Your solution should use no non-Karel features (i.e. variables, break statements, etc)

Python

Write a program that reads in integers one by one from the user and prints out whether those integers are perfect. A perfect number is a number whose factors sum is the same as itself. For example, 28 is a perfect number, since its factors (1, 2, 4, 7 and 14) sum to 28. On the other hand, 42's factors (1, 2, 3, 6, 7, 14, 21) sum to 58, and so it isn't a perfect number. Your program should print an error message if the number entered is negative, and should end when the user types 0. A sample run of the program is below (user input is in *italic*):

```
Your number: -12
Please enter a positive number
Your number: 28
28 is perfect!
Your number: 42
42 is not perfect!
Your number: 0
```