Fall 2019 Honors Introduction to C Programming (COP 3223H) Exam #1 – Python
Date: 9/27/2019

First Name: _____ Last Name: _____

1) (6 pts) Write a single Python statement that produces the following output:

```
\\\
"'"
\\\
```

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2) (10 pts) Write a complete Python program that prompts the user for the length and width of a TV in inches (real numbered values) and prints out the length of the diagonal of the TV in inches.

3) (10 pts) A Martian leap year is all years divisible by 5 or divisible by 7, but not divisible by both. Complete the Python program below so that after it reads in the year from the user to consider, it prints out "YES" if the year is a Martian leap year and "NO" otherwise.

```
year = int(input("What year would you like to consider?\n"))
```

4) (10 pts) The n^{th} Triangle number is the sum of the first n positive integers. Complete the Python program below so that after it reads in a positive integer n from the user, it prints out a chart with the first n Triangle numbers. To earn full credit you must solve the problem with a single loop (and no nested loop.) Partial credit will be given for a nested loop solution. For example, if the user entered n = 5, your program should print the following:

```
n    tri(n)
-    ------
1    1
2    3
3    6
4    10
5    15
```

```
n = int(input("Enter n.\n"))
```

5) (10 pts) What is the output of the following code segment?

```
a = 193
b = 73
while b > 0:
    c = a%b
    print(c, end=", ")
    a = b
    b = c
```

_____

6) (15 pts) The birthday paradox is the result that it only takes 23 people in a room together before there is greater than a 50% chance that two of the people share a birthday. A simulation illustrating this paradox can be written as follows. Imagine asking people, one by one, what their birthday is. For the purposes of this problem, let's assume everyone's birthday is a random integer in between 0 and 364, inclusive. We keep on doing this until we get our first repeat. Write a function in Python that takes no parameters, runs this simulation (don't ask anyone, just generate a random integer in between 0 and 364) and returns the number of people that had to be asked before the first repeat occurred. (Hint: In your function, create a frequency array of size 365, where each index stores the number of people with each birthday.)

```
import random

def birthdaySim():
```

7) (10 pts) Write a function that takes in two lists of integers guaranteed to be of equal sizes and returns the dot product of the two lists. (To take the dot product of two lists, multiply the two elements in each corresponding index and add the results. For example the dot product of [3, 2, 5, 1] and [6, -1, 3, 2] is 3*6 + 2*(-1) + 5*3 + 1*2 = 18 – 2 + 15 + 2 = 33.)

```
def dotproduct(list1,list2):
```

8) (20 pts) Given a string, s, of length n and a positive integer k such that n is a multiple of k, we can perform a k-tile reversal of s by dividing the string into n/k sections, each of length k, and then reversing the order of each section (but keeping each section of letters in order.) For example, if s = "profiteering" and k = 3, we partition the string into 4 pieces: "pro", "fit", "eer" and "ing". When we reverse the sections, we get the string "ingeerfitpro". Write a function in Python that takes in a string s, an integer k such that k divides evenly into the length of s, and prints out the k-tile reversal of s. (Note: don't return this, just print it out. You can also print it out piece by piece instead of printing out the whole thing at once, if you find this easier.)

```
def ktilereversal(s, k):
```

9) (6 pts) Provide three different practical uses of a dictionary in Python.

10) (3 pts) How many symphonies did Beethoven write before his famous Fifth Symphony? ___

Python Library Functions

```
# Returns a pseudorandom integer in between a and b, inclusive.
random.randint(a,b)

# Returns the square root of x.
math.sqrt(x)
```

Scratch Page – Please clearly mark any work below that you would like graded.