

6.00 Quiz 2, Practice Questions

This quiz is open book and open notes, but do not use a computer (or cell phone!). You have 90 minutes.

Please **write your name on the top of each page**. Answer all questions in the boxes provided.

1) Are each of the following True or False?

T

1.1. In Python, a subclass can override methods of its superclass.

F

1.2. Standard deviation and coefficient of variation are different names for the same thing.

T

1.3. Unit testing is useful for debugging.

F

1.4. In Python, functions **cannot** be used as actual parameters.

F

1.5. Increasing the size of a hash table typically **increases** the amount of time needed to locate a value in the table.

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2) What does the following code print?

```
x = '11010'  
y = 0  
for i in range(len(x)):  
    y += int(x[i])*(2**i)  
print y
```

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3) Consider the code:

```
import random
g1 = 0
g2 = 0
mean = 100.0
stdDev1 = 0.0
stdDev2 = 20.0
for i in range(1000):
    g1 += random.gauss(mean, stdDev1)
    g2 += random.gauss(mean, stdDev2)
```

3.1) What is the expected value of g1? (4 points)

100k

3.2) What is the expected value of g2? (4 points)

100k w 20k deviation

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4) Consider the code:

```
num6 = 0
for test in range(10):
    d = random.choice(range(10))
    if d == 6:
        num6 += 1
```

What is the probability of the final value of num6 being 0? (10 points)

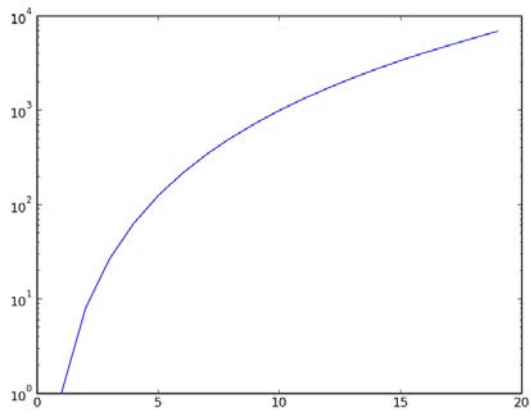
.348 which is $(9/10)^{10}$

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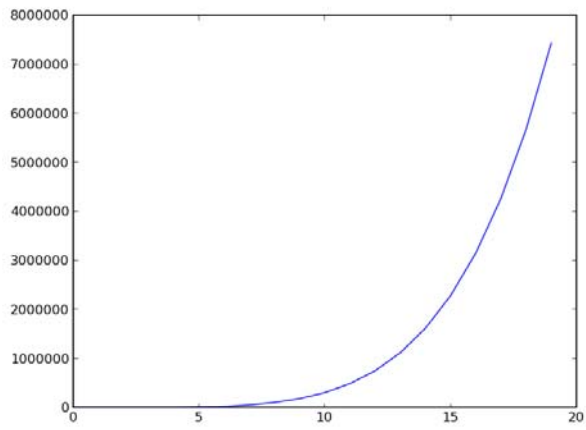
5) The code below produces three plots. Match each of the plots on the next page with the appropriate figure (Figure 1, Figure 2, or Figure 3). (15 points)

```
y1 = []
y2 = []
y3 = []
for i in range(20):
    y1.append(3*i**5)
    y2.append(i**3)
    y3.append(3**i)
pylab.figure(1)
pylab.plot(y1)
pylab.figure(2)
pylab.plot(y2)
pylab.semilogy()
pylab.figure(3)
pylab.plot(y3)
pylab.semilogy()
pylab.show()
```

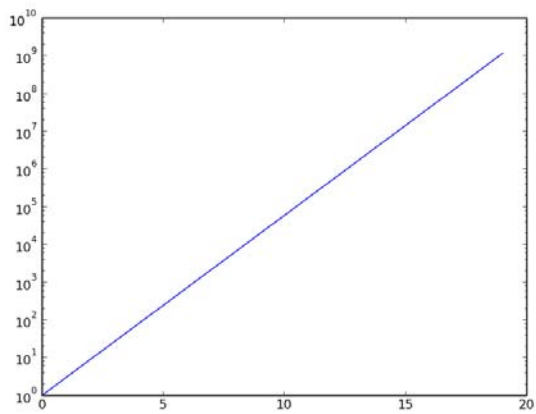
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y_2



y_1



y_3

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6) What does the following code print?

```
class Shape(object):
    def __eq__(s1, s2):
        return s1.area() == s2.area()
    def __ge__(s1, s2):
        return s1.area() >= s2.area()

class Square(Shape):
    def __init__(self, h):
        self.side = float(h)
    def area(self):
        return self.side**2
    def __str__(self):
        return 'Square with side ' + str(self.side)

class Circle(Shape):
    def __init__(self, radius):
        self.radius = radius
    def area(self):
        return 3.14159*(self.radius**2)
    def __str__(self):
        return 'Circle with radius ' + str(self.radius)

def f(L):
    if len(L) == 0: return None
    x = L[0]
    for s in L:
        if s >= x:
            x = s
    return x

s = Square(4)
print s.area()
L = []
shapes = {0:Circle, 1: Square}
for i in range(10):
    L.append(shapes[i%2](i))
print L[4]
print f(L)
```

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circle with radius 4

3.14 * (8**2)

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7) Consider the two functions specified below that are used to play a “guess a number game.”

```
def cmpGuess(guess, maxVal):  
    """Assumes that guess is an integer in range(maxVal).  returns  
    -1 if guess is < than the magic number, 0 if it is equal to the  
    magic number and 1 if it is greater than the magic number.  The  
    magic number is in range(maxVal)."""  
  
def findNumber(maxVal):  
    """Assumes that maxVal is a positive integer.  Returns a  
    number, num, such that cmpGuess(num, maxVal) == 0."""
```

Write a Python implementation of `findNumber` that guesses the magic number defined by `cmpGuess`. Your program should run in $O(\log \text{maxVal})$ time.

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