

Name: _____ Recitation: _____ Andrew Id: _____

15-112 Spring 2018 Quiz 2

Up to 20 minutes. No calculators, no notes, no books, no computers. Show your work!

1. (30 points) **Code Tracing:** Indicate what the following program prints. Place your answers (and nothing else) in the box under the code.

```
def ct1(s):
    a = len(s) - 1
    b = ""
    for i in range(a, 0, -2):
        b = s[i] + b
        c = int(s[i-1])
        print(s[i:c])
    return b
print(ct1("s3a1n4d2y")) # string length: 9
```

2. (20 points) **Code Tracing:** Indicate what the following program prints. Place your answers (and nothing else) in the box under the code.

```
def ct2(x):
    a = 1
    while x > 1:
        print("Round %d, %0.1f" % (a, x))
        a += 1
        newX = (x ** 2) % 10
        if x == newX:
            print("boom!")
            break
        x = newX
    return x
ct2(8)
```

3. (20 points) **Reasoning Over Code:** Find an argument for `roc1` that makes it return `True`. Place your answer (and nothing else) in the box under the code.

```
def roc1(s):  
    a = ""  
    b = 0  
    for c in s:  
        if c in a:  
            b += 1  
        else:  
            a += c  
    return len(s) == 6 and b == 2
```

4. (40 points) **Free Response:** A positive number n is considered powerful if it has at least two different prime numbers as factors and it is the case that, for every prime number p which is a factor of n , p^2 also divides n . For example, 36 is powerful because 2 and 3 are its only prime factors, and 4 and 9 both divide 36.

Write the function `nthPowerfulNumber(n)`, which takes a non-negative integer n and returns the n th powerful number. **You may assume that `isPrime` has already been written.** `nthPowerfulNumber(0)` should return 36. The first several powerful numbers are: 36, 72, 100, 108, 144, 196, 200, 216, 225, 288...