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15-112 Summer 2019 Quiz 1

Up to 40 minutes. No calculators, no notes, no books, no computers, no extra paper. Show your work!

Do not use lists, sets, dictionaries, or recursion on this quiz.

1. (35 points) **Free Response: isCountish and nthCountish.** A number is considered "countish" (a coined term) if it contains zero 0's (not counting leading 0's), one 1, two 2's, etc., up until the largest digit in the number. So, for example, 312233 is countish, but 3122332 is not (it has an extra 2). We do not consider 0 to be a countish number.

With this in mind, write the function the function `isCountish(n)` that takes a possibly negative integer `n` and returns `True` if `n` is "countish", and `False` otherwise. Also, write the function `nthCountish(n)` that returns the `n`th "countish" number. `nthCountish(0)` should return 1.

Note: You cannot use strings in this problem. Any solution that uses strings will receive no credit.

2. (25 points) **Free Response:** Write the function `snazziestWord(message, letterPoints)` that takes in a `message`, a space-separated string of words, and returns the "snazziest" word within the message as defined by `letterPoints`. `letterPoints` is a string where each character occurs a maximum of once, and a character's index in the string represents the number of "snazzy" points it should be awarded (starting at 1). The "snazzy score" of a word is the sum of all the points of each character in that word.

For example, if `letterPoints = "abc"`, then "a" has 1 point, "b" has 2 points, and "c" has 3 points. Any character not in `letterPoints` should be awarded 0 points. So, using `letterPoints = "abc"`, the word "cat" is worth 4 snazzy points ("c" has 3 points, "a" has 1 point, and "t" has 0 points).

For example, if `message = "one small step for man"`, and `letterPoints = "aml"`, then `snazziestWord` should return "small", since "small" is the highest scoring word, with a score of $0+2+1+3+3 = 9$.

3. (5 points) **Short Answer**

- (a) Name 2 distinct course resources you can use if you are struggling with one or more of the HW problems.
- (b) Say there is a Python program that contains a runtime error, a syntax error, and a logical error. Which one will Python report first when you run the program?
- (c) Write a Python expression that uses short-circuit evaluation.
- (d) What is the length of the following string: `"ab\t?1\n\"`?
- (e) What does the following expression evaluate to: `"TA's are superheroes!!".find("a")`

4. (10 points) **Code Tracing:** Indicate what the following program prints. Place your answer (and nothing else) in the box to the right of the code.

```
def ct1(n):
    k = 1
    res = 0
    while (k < n):
        print("k =", k)
        if n%10 == k:
            print("yeet")
            n //= 10
        else:
            for i in range(0, k, 2):
                res += n %10
                n //= 10
            print(i, res, k)
        k *= 2
print(ct1(8531))
```

5. (10 points) **Code Tracing:** Indicate what the following program prints. Place your answer (and nothing else) in the box to the right of the code.

Note: you don't need to know the actual values for the ord of a character for this problem! You can (and should) solve this problem without needing to use those values.

```
def f(a):
    res = ""
    for c in a:
        res += chr(ord(c) + 2)
    return res

def ct2(a, b):
    result = 0
    while len(a) > 0:
        if a.isupper():
            print(f(a))
        else:
            print(a)
            result += b.count(a[0])

        a = a[-2:0:-1]
    return result

print(ct2("abCDEFgh", "yang gang"))
```

6. (15 points) **Reasoning Over Code:** Find an input value for `s` that makes `roc(s)` return `True`. Place your answer (and nothing else) in the box to the right of the code. Assume that the function `isPrime` exists and works as presented earlier in the course.

```
def f(s):
    a = 0
    for c in s:
        a += (ord(c) - ord('c'))
    return a // len(s)

def roc(s):
    assert(len(s) == 6)
    a = f(s)
    b = f(s[:2])
    return isPrime(a) and isPrime(b) and a != b
```