Name: ______________________________ Andrew Id: ____________________

15-112 Fall 2023 Quiz 9

Up to 20 + 5 minutes (finish within 20 minutes for 1-point proficiency bonus)
No calculators, no notes, no books, no computers. Show your work!
Do not use try/except on this quiz

1. (6 points) **Code Tracing**: Indicate what the following program prints. Place your answer (and nothing else) in the box next to the code. Ensure strings are enclosed with quotes and the uppercase and lowercase are distinguishable.

```
def ct(L):
    if len(L) == 1:
        return [L[0]]
    x = len(L)//2
    print(str(L[:x]) + " -- " + str(L[x:]))
    nextL = ct(L[x:])
    print(f'mid {nextL}')
    return nextL + L[:x]

print(ct([1,2,3,4,5]))
```

2. (4 points) **Reasoning Over Code**: Find an argument, `x`, for the function `roc` to cause it to return `True`. Place your answer (and nothing else) in the box below the code. Make sure strings are enclosed with quotes.

   Note: `rocHelper(x)` is a helper function, and your answer should refer to `roc(x)`.

```
def rocHelper(x):
    if len(x) == 0:
        return "baseCase"
    elif len(x) == 1:
        return x
    elif x[0] <= x[1]:
        return rocHelper(x[2:])
    else:
        return rocHelper(x[2:]) + x[:2]

def roc(x):
    res = rocHelper(x)
    return res.isdigit() and int(res) > 1000
```

3. (10 points) **Free Response**: Recursive String Slicing

Write the **recursive** function `recStringSlice(s, start, end, step)` that takes a string `s`, and three integer values `start`, `end`, `step`. The function returns the same result as the slicing operator `s[start:end:step]`. For instance,

```
assert(recStringSlice("hello15112", 5, 10, 1) == '15112')
assert(recStringSlice("hello15112", 2, 7, 2) == 'lo5')
assert(recStringSlice("hello15112", 1, 6, 3) == 'eo')
assert(recStringSlice("quiz", 5, 6, 1000) == '')
assert(recStringSlice("quiz", 2, 100, 4) == 'i')
```

Your solution must be entirely recursive. No loops or iterative functions are allowed; using them will result in a zero score for this problem.

Note: You are permitted to use regular slicing only to remove the first or last character of the string, as demonstrated in class.

Hint: You may write helper functions and use optional arguments with default values. It may be helpful to use an argument to keep track of the depth of the recursion.