CSCI 150 HW: recursion

Due: Wednesday, November 14

To receive full credit, for each exercise you should do the following:

1. **Design**: First, write a Python function as requested in the exercise.

2. **Check**: Run the provided test code. Does your actual output agree with the given correct output?

3. **Evaluate**: If the actual output does not match the expected output, keep experimenting, consult the textbook or Python documentation, ask a friend or TA or professor, *etc.* until you can fix your class definition and explain what your misunderstanding(s) were. (You do not need to do anything for step 3 if the outputs already agree exactly.)

You should consider the code in each exercise separately from the other exercises.

1. Recall that on the second exam, you were asked to write a function `logarithm(b,n)`, which counts how many times `n` has to be divided by `b` before falling below `b`:

```python
def logarithm(b: float, n: float) -> int:
    count: int = 0
    while n >= b:
        count += 1
        n /= b
    return count
```

Write a new version of `logarithm` which uses recursion instead of a `while` loop.

To test your function, you can type in the following tests:

```python
def main():
    print(logarithm(2, 128) == 7)
    print(logarithm(2, 35)  == 5)
    print(logarithm(5, 125) == 3)
    print(logarithm(2, 1)   == 0)
    print(logarithm(2, 3)   == 1)
    print(logarithm(10, 19740983) == 7)
```

If you have implemented `logarithm` correctly, `main()` should print `True` six times.

2. Write a recursive function `is_palindrome` which takes a string as a parameter and returns a `boolean` indicating whether the string is a palindrome (a palindrome is a string which is equal to its reversal).

You can test your function with this `main2()`, which should print all `True`:

```python
def main2():
    print(is_palindrome('kayak'))
    print(is_palindrome('kayyak'))
    print(is_palindrome(''))
    print(is_palindrome('a'))
    print(is_palindrome('aa'))
    print(not is_palindrome('ab'))
    print(not is_palindrome('bbbbbbcbbb'))
    print(not is_palindrome('myhelicopterisfullofeels'))
    print(is_palindrome('amanaplanacanalpanama'))
```