

# Recursion I

## Factorials are Factorials Times Factorials

Factorials are defined as the product of an integer with all integers below it. For example,  $\text{factorial}(5) = 5 \times 4 \times 3 \times 2 \times 1$ . Fill in the code below to recursively compute a factorial.

```
factorial(n):  
    if _____:  
        report _____  
    else:  
        report _____
```

## PalindromeemordnilaP

(a) A palindrome is a word that is spelled the same way forwards and backwards. In other words, the first letter must equal the last letter, the second letter must equal the second to last letter ... etc.

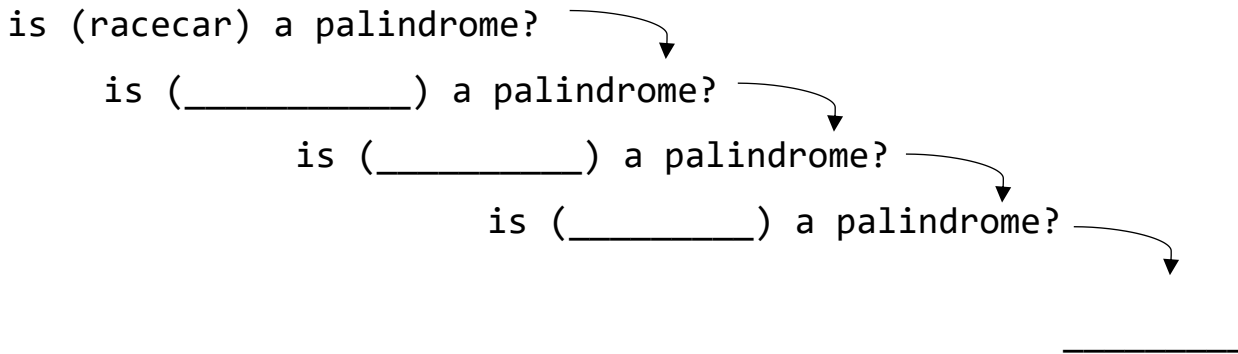
Using the above information, fill in the recursive palindrome function. You have access to these two functions:

```
all-but-first-of( word )  
    reports word with the first letter gone  
all-but-last-of( word )  
    reports word with the last letter gone
```

is (word) a palindrome?:





```
if _____:  
    report _____  
else:  
    if _____:  
        report _____  
    else:  
        report _____
```

(b) Fill in the progression of calls to: is (racecar) a palindrome?



### Where are These Cats Coming From?!

In the following exercise, we will address how to construct and how to think about fractals recursively. You may assume that the sprite starts off at the leftmost part of each level, facing right. *Note that each level is 1/3 of the size of the previous level.*

Level 1: 	Level 2: 
Level 3: 	Level 4: 

- 1) Which level corresponds to the base case? \_\_\_\_\_
- 2) For our base case, in what direction does our sprite start and end in?
- 3) In each level, circle each instance of the previous level. Each of these instances refers to one recursive call.
- 4) What does the sprite do between each of the recursive calls?