(K) Sentences that go on and on and on and on (1/2) [10 points]

Sometimes a sentence can be made longer by adding words in a regular way. In some cases a consistent pattern of several words can be added ("climbing up a tree" and "growing on a planet" use different words, but have the same word types):

I saw a cat.
I saw a cat climbing up a tree.
I saw a cat climbing up a tree growing on a planet.
I saw a cat climbing up a tree growing on a planet orbiting around the sun.

I live in the house.
I live in the house on the hill.
I live in the house on the hill in the city.
I live in the house on the hill in the city on the border.

Answer the following questions in the Answer Sheets.

K1. First, write down the word types that form each pattern, using Adjective, Verb, Noun, Preposition, and Article (a table of words and types is included at the end of the problem):

a. I saw a cat climbing up a tree growing on a planet orbiting around the sun.
b. I live in the house on the hill in the city on the border.

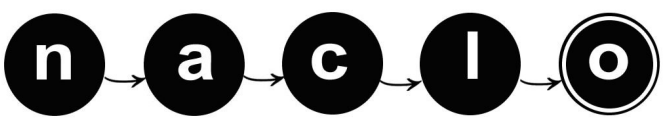
Now, for each case, write a fifth line that follows the pattern. You may use words not shown in the table below, but the words you use should follow the patterns you identified:

a.

b.

K2. A computer program was written to identify these patterns. It worked as follows:

- Set current guess to None
- Check whether the last word's type matches the second-last word's type, if it does, change guess to the last word's type
- Check whether the last pair of words' types match the pair before them, if they do, change guess to the types of the last pair
- Check whether the last three words' types match the three before them, if they do, change guess to the types of the last three words
- (and so on until the first half of the sentence and second half of the sentence are being compared)
- Return the current guess



(K) Sentences that go on and on and on (2/2)

If each time K words are compared it takes K steps, how many steps will it take to run the program on this example: *I run and jump and twirl*.

K3. For the two examples below, would the computer find the right pattern? If so, write 'yes', if not, write 'no' and what pattern (Verb, Noun, etc.), it would return instead.

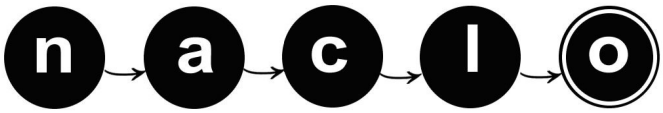
a. I saw a cat climbing up a tree growing on a planet orbiting around the sun.
b. I live in the house on the hill in the city on the border.

a.

b.

K4. Some sentence patterns can go on and on and on, but the computer program above will never be able to find a repeating sequence in them, no matter how long the sentences go. Give an example of such a sentence pattern.

Word Types

All the words used in the examples above can be found in the lists of word types below. In the first question you may use words in your example that are not shown here.

Noun	*Noun*	*Verb*	*Verb*	*Preposition*	*Adjective*	*Article*
border	house	climbing	orbiting	around	blue	a
cat	I	growing	run	in	nice	the
city	planet	have	saw	on	waterproof	
hat	sun	jump	twirl	up		*Conjunction*
hill	tree	live				and