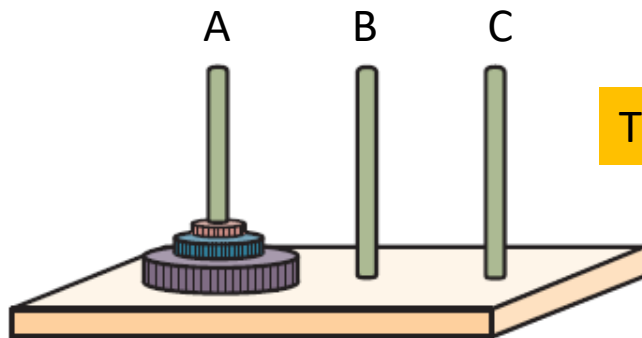


Assignment 4

1. The puzzle called the Towers of Hanoi consists of three pegs, one of which contains several rings stacked in order of descending diameter from bottom to top. The problem is to move the stack of rings to another peg. You are allowed to move only one ring at a time, and at no time is a ring to be placed on top of a smaller one. Observe that if the puzzle involved only one ring, it would be extremely easy. Moreover, when faced with the problem of moving several rings, if you could move all but the largest ring to another peg, the largest ring could then be placed on the third peg, and then the problem would be to move the remaining rings on top of it. Using this observation, develop a recursive algorithm (**pseudocode**) to move an arbitrary number of rings from A to C.(20 points)



The number of rings to be moved is represented by **n**.

2. Translate the following statement into the **Vole machine language** described in Appendix C (textbook). Suppose **Length**, **Width**, and **Halfway** are all represented in floating-point notation, and their addresses are XX, YY, and ZZ, respectively.

(20 points)

Halfway = Length + Width

3.

Suppose the Python function `Modify` is defined by

```
def Modify (Y):  
    Y = 7  
    print(Y)
```

If parameters are passed by value, what will be printed when the following program segment is executed? What if parameters are passed by reference?

```
X = 5  
Modify(X)  
print(X)
```

(20 points)

4.

Suppose the Python function `Modify` is defined by

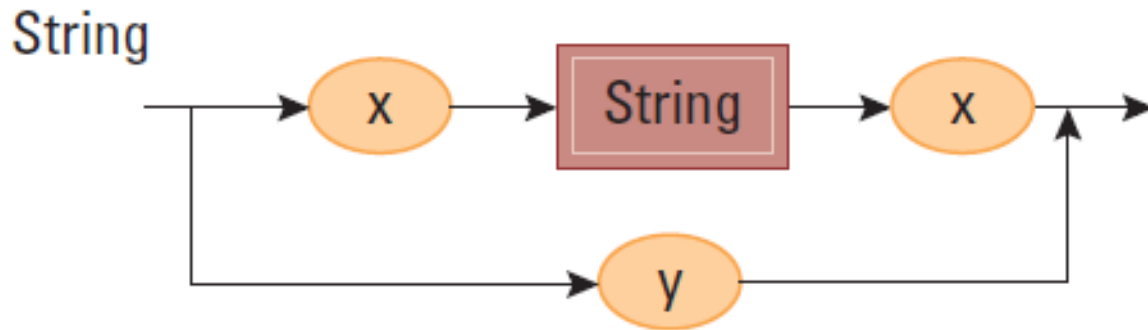
```
def Modify (Y):  
    Y = 9  
    print(X)  
    print(Y)
```

Also suppose that `X` is a global variable. If parameters are passed by value, what will be printed when the following program segment is executed? What if parameters are passed by reference?

```
X = 5  
Modify(X)  
print(X)
```

(20 points)

5. Write a sentence describing the structure of a string as defined by the following syntax diagram. Then, draw the parse tree for the string xxyxx.



(20 points)