Question 1

1. This code is saved in 4_1.py.
2. The program contains 2 classes: Node, SinglyLinkedList. The SinglyLinkedList contains a method named recursive_count which recursively counts the number of nodes in a singly linked list.
3. The input of the recursive_count function should be a reference pointing to the first node of the linked list. The output of the function should be the number of nodes in that linked list.
4. Execute as followings:

```
27 ∨ if __name__ == '__main__':
28       l = SinglyLinkedList()
29       l.insert(2)
30       l.insert(1)
31       l.insert(0)
32       print("The number of nodes is %d" % l.recursive_count(l.head))
```

```
问题   输出   调试控制台   终端

Windows PowerShell
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尝试新的跨平台 PowerShell https://aka.ms/pscore6

PS C:\Users\24984\Desktop\CSC1001\Assignments\4>  & 'C:\Users\24984\AppData\Local\Programs\Python\Pytho
ython\debugpy\launcher' '61851' '--' 'c:\Users\24984\Desktop\CSC1001\Assignments\4\4_1.py'
The number of nodes is 3
```

Question 2

1. This code is saved in 4_2.py.
2. The program contains 2 classes: Node, SinglyLinkedList. The SinglyLinkedList contains a method named quick_sort which uses quick sort algorithm to sort over a singly linked list.
3. The input of your function should be a reference pointing to the first node of a linked list, and the output of your function should also be a reference to the first node of a linked list, in which the data have been sorted into the ascending order.
4. Execute as followings:

```
if __name__ == '__main__':
    l = SinglyLinkedList()
    l.insert(6)
    l.insert(8)
    l.insert(3)
    l.insert(10)
    l.insert(2)
    l.insert(2)

    print(l.head)
    l.print_all_nodes()
    print()
    l.quick_sort(l.head)
    print(l.quick_sort(l.head))
    l.print_all_nodes()
```

```
PS C:\Users\24984\Desktop\CSC1001\Assignments\4>
ython\debugpy\launcher' '61903' '--' 'c:\Users\249
<__main__.Node object at 0x0000026083748340>
2 2 10 3 8 6
<__main__.Node object at 0x0000026083748340>
2 2 3 6 8 10
```

Question 3

1. This code is saved in 4_3.py.
2. The program prompts user to input the number of disks in Tower of Hanoi game. After that, it will print out the steps to move all the disks from rod A to rod C via rod B.
3. The input can be anything, but only a positive integer number input can be executed.
4. Execute as followings:

```
PS C:\Users\24984\Desktop\CSC1001\Assignments\4>  & 'C:\
ython\debugpy\launcher' '61987' '--' 'c:\Users\24984\Des
Please enter the number of disks: dasd
The input should be a positive integer!
Please enter the number of disks: 1.22
The input should be a positive integer!
Please enter the number of disks: -12
The number of disks should be positive!
Please enter the number of disks: 3
A --> C
A --> B
C --> B
A --> C
B --> A
B --> C
A --> C
```