Assignment 1

**Suppose that a client performs an intermixed sequence of (stack) push and pop operations. The push operations put the integers 0 through 9 in order onto the stack; the pop operations print out the return values. Which of the following sequence(s) could not occur?**

**Stack operations to push integers from 0 to 9 in order**

**[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]**

1. **4 3 2 1 0 9 8 7 6 5 - Possible**

push (0), push(1), push(2), push(3), push(4), pop(), pop(), pop(), pop(), pop(), push(5), push(6), push(7), push(8), push(9), pop(), pop(), pop(), pop(), pop()

[~~0~~, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5,~~ ~~6,~~ ~~7,~~ ~~8,~~ ~~9]~~

1. **4 6 8 7 5 3 2 9 0 1 - impossible**

push(0), push(1), push(2), push(3), push(4), pop(), push(5), push(6), pop(), push(7), push(8), pop(), pop(), pop(), pop(), pop(), push(9), pop(), pop

[0, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9~~, it removes 1 instead of 0 and hence it could not occur the sequence.

1. **2 5 6 7 4 8 9 3 1 0 - Possible**

Push(0), push(1), push(2), pop(), push(3), push(4), push(5), pop(), push(6), pop(), push(7), pop(), pop(), push(8), pop(), push(9), pop(), pop(), pop(), pop()

[~~0~~, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9]~~

1. **4 3 2 1 0 5 6 7 8 9 - Possible**

Push(0), push(1), push(2), push(3), push(4), pop(), pop(), pop(), pop(), pop(), push(5), pop(), push(6), pop(), push(7), pop(), push(8), pop(), push(9), pop()

[~~0~~, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9~~]

1. **1 2 3 4 5 6 9 8 7 0 - Possible**

Push(0), push(1), pop(), push(2), pop(), push(3), pop(), push(4), pop(), push(5), pop(), push(6), pop(), push(7), push(8), push(9), pop(), pop(), pop(), pop()

[~~0~~, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9~~]

1. **0 4 6 5 3 8 1 7 2 9 - impossible**

Push(0), pop(), push(1), push(2), push(3), push(4), pop(), push(5), push(6), pop(), pop(), pop(), push(7), push(8), pop(), pop()

[~~0~~, 1, 2, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, it pops 7 instead of 1 and hence it could not occur the sequence.

1. **1 4 7 9 8 6 5 3 0 2 - impossible**

Push(0), push(1), pop(), push(2), push(3), push(4), pop(), push(5), push(6), push(7), pop(), push(8), push(9), pop(), pop(), pop(), pop(), pop(), pop(), pop()

[0, ~~1~~, 2, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9~~] next pop gives 2 instead of 0 and hence it could not occur any sequence.

1. **2 1 4 3 6 5 8 7 9 0 - Possible**

Push(0), push(1), push(2), pop(), pop(), push(3), push(4), pop(), pop(), push(5), push(6), pop(), pop(), push(7), push(8), pop(), pop(), push(9), pop(), pop()

[~~0~~, ~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~6~~, ~~7~~, ~~8~~, ~~9~~]