

Problem 4: Given an array of $N + 1$ size, where each element is between 1 and N . Assuming there is only one duplicate number, your task is to find the duplicate number.

```
def find_duplicate(arr):
```

```
    slow = arr[0]
```

```
    fast = arr[0]
```

```
    while True:
```

```
        slow = arr[slow]
```

```
        fast = arr[arr[fast]]
```

```
        if slow == fast:
```

```
            break
```

```
    slow = arr[0]
```

```
    while slow != fast:
```

```
        slow = arr[slow]
```

```
        fast = arr[fast]
```

```
    return slow
```

```
# Test cases
```

```
arr1 = [1, 3, 4, 2, 2]
```

```
print(find_duplicate(arr1))
```

```
arr2 = [3, 1, 3, 4, 2]
```

```
print(find_duplicate(arr2))
```

```
23 print(find_duplicate(arr2))
24
input
2
3
...Program finished with exit code 0
Press ENTER to exit console.
```