#

Growth of functions Homework

Q1)

C

Q2)

E

Q3)

$$3^n \leq 5^n$$

at c = 1, k =1

$$f(n) \leq g(n)$$

$$f(n) = O(g(n))$$

But

$$g(n) \neq O(f(n))$$

$$5^n \leq 3^n$$

$$(5^n \leq 3^n) \div 3^n$$

$$(\frac{5}{3})^n \leq 1$$

since

$$\frac{5}{3} \geq 1$$

then

$$g(n) \neq O(f(n))$$

since

$$f(n) = O(g(n)), g(n) \neq O(f(n))$$

then

$$f(n) \neq \theta(g(n))$$

Q4)

```
nums = [34, 68, 83, 84, 59, 94, 89, 100, 53, 80, 76, 26, 6, 70, 28, 67, 10, 78, 40, 17, 75,

added = []

for num in nums:
    if num in added:
        print(str(num) + ' is repeated!')
        exit(1)
    added.append(num)

print('No numbers were repeated')
```

The time Complexity is

$$O(n^2)$$

Since

```
for num in nums:
```

Is

$$O(n)$$

And

```
if num in added:
```

Is

$$O(n)$$

Then the Time complexity is

$$O(f(n)) = O(n) * O(n)$$

$$O(f(n)) = O(n^2)$$