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ECE 241 Advanced Programming FA 20

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Project 1

Set up:

```
lib = COV19Library()
lib.LoadData("cov19_city.csv")
# ensure all ids are unique by using a set (no duplicates)
unique_ids = {lib.cityArray[-1].cid}
# fill the set with 100 ids
while len(unique_ids) <= 100:
    rand_pos = random.randint(0, lib.size-1)
    unique_ids.add(lib.cityArray[rand_pos].cid)
```

Question 5.

On average the time spent building the BST was 0.01 seconds

```
print("BST built time:", end=" ")
st = time.time()
lib.buildBST()
# time spent building BST
bst_build_time = time.time() - st
print(bst_build_time)
```

Question 7.

On average the time spent for a linear search of size 100 was 0.003 seconds

```
print("Linear search time:", end=" ")
st = time.time()
for id in unique_ids:
    lib.linearSearch(id, "id")
# time spent on linear search
lin_time = time.time() - st
print(lin_time)
```

Question 8.

On average the time spent for a BST search of size 100 was 0.0002 seconds

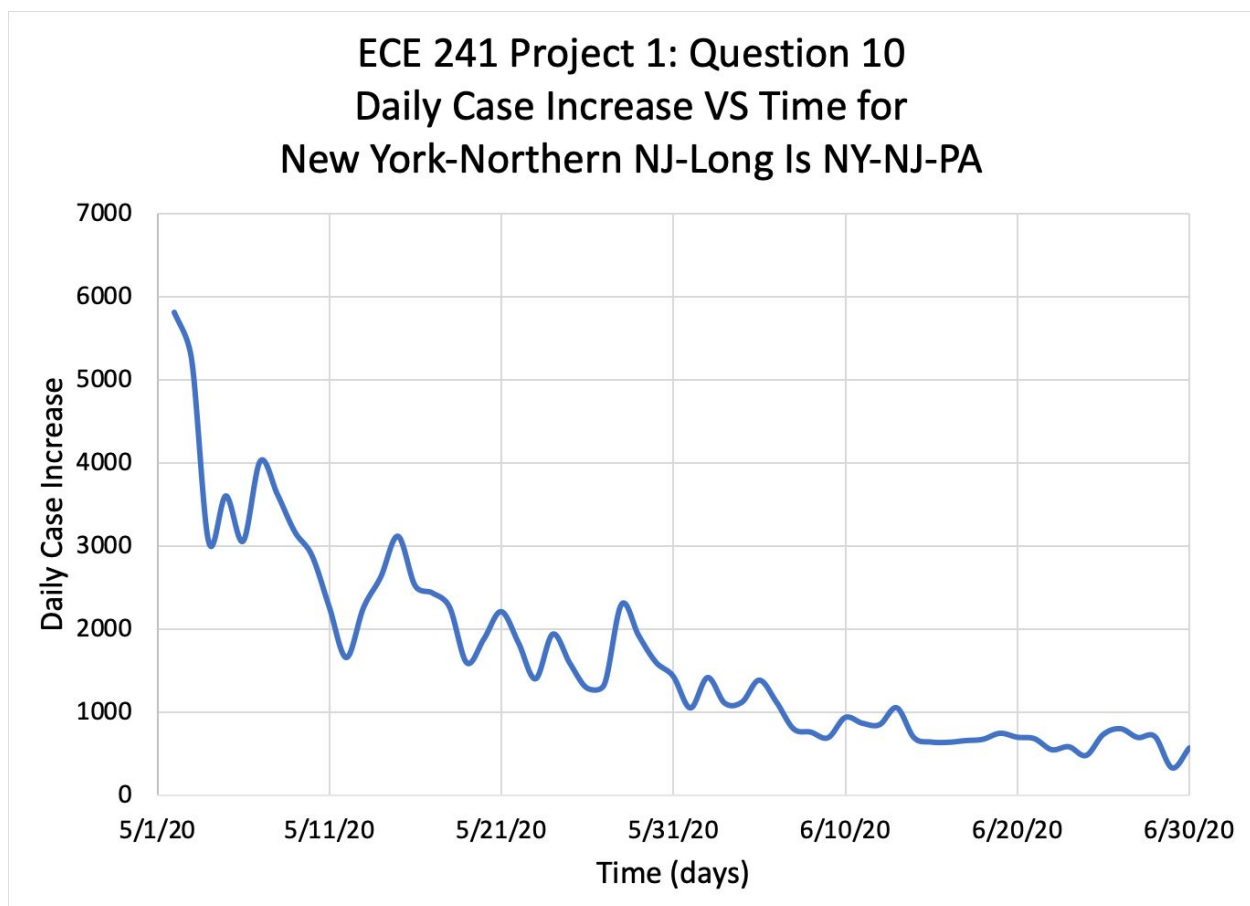
```
print("BST search time:", end=" ")
st = time.time()
for id in unique_ids:
    lib.searchBST(id)
# time spent on BST search
bst_search_time = time.time() - st
print(bst_search_time)
```

Question 9.

It would take approximately 4 linear searches of size 100 for the total time to equal the total time of building a BST (once) and doing 4 BST searches of size 100.

```
bst_time = bst_search_time + bst_build_time
n = bst_build_time / (lin_time - bst_search_time)
```

Question 10.



Question 11.

Stormy Lake is the city with the highest rate of confirmed cases in June.

```
lib = COV19Library()
lib.LoadData("cov19_city.csv")
sickest = None
highest_rate = 0
for city in lib.cityArray:
    daily_inc = []
    for index in range(31, len(city.cases) - 1):
        daily_inc.append(city.cases[index + 1] - city.cases[index])
    if sum(daily_inc)/int(city.pop) > highest_rate:
        highest_rate = sum(daily_inc)/int(city.pop)
        sickest = city
print(sickest)
# cid: 44740; cname: Storm Lake; cstate: IA; cases:1695
```