CS2040S Recitation 7

AY 24/25 Sem 2 — github/omgeta

Q1. (a.) Time: $O(n^2)$

```
for i in [1,... , n]:
   for j in [1, ..., n]:
   if A[i] + A[j] == x:
   return true
return false
```

(b.) Time: $O(n \log n)$

```
Sort(A)
for each i in [1, ..., n]:
   find(x-A[i], A) by binary search
```

(c.) Time: $O(n)$

```
insert all A into hash table H
for each i in [1, ..., n]:
   find(x-A[i], H)
```

(d.) Solution:

```
for each i in [1, ..., n]:
   for each j in [1, ..., n]:
   if A[i] + A[j] == x:
   append (i, j) to output
return output
```

(e.) Time: $O(n^2)$

```
Insert all (i, j) pairs to H[A[i] + A[j]]
for each k:
   look for x - A[k] in H
```

Q2. (a.) First two cases are $O(1)$ amortised, while last is unbounded.

(b.) $O(n)$

(c.) Worst case lookup is $O(1)$, theres no clustering, deletions are simple and deterministic location is good for parallelism.