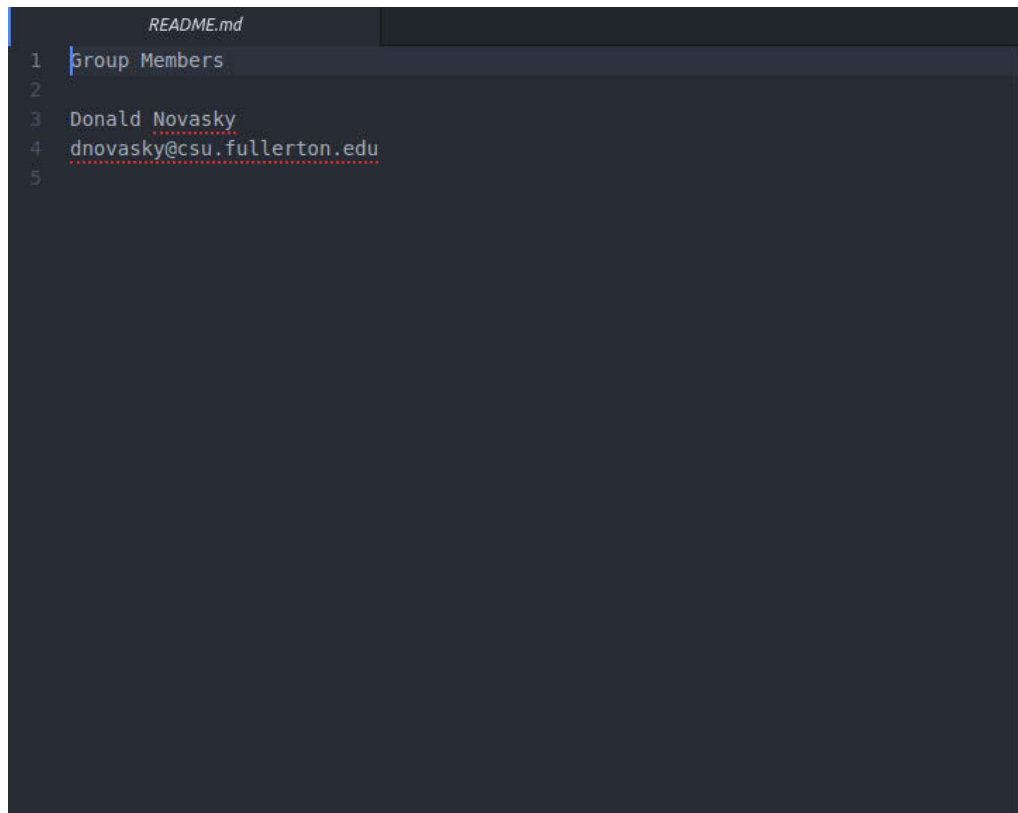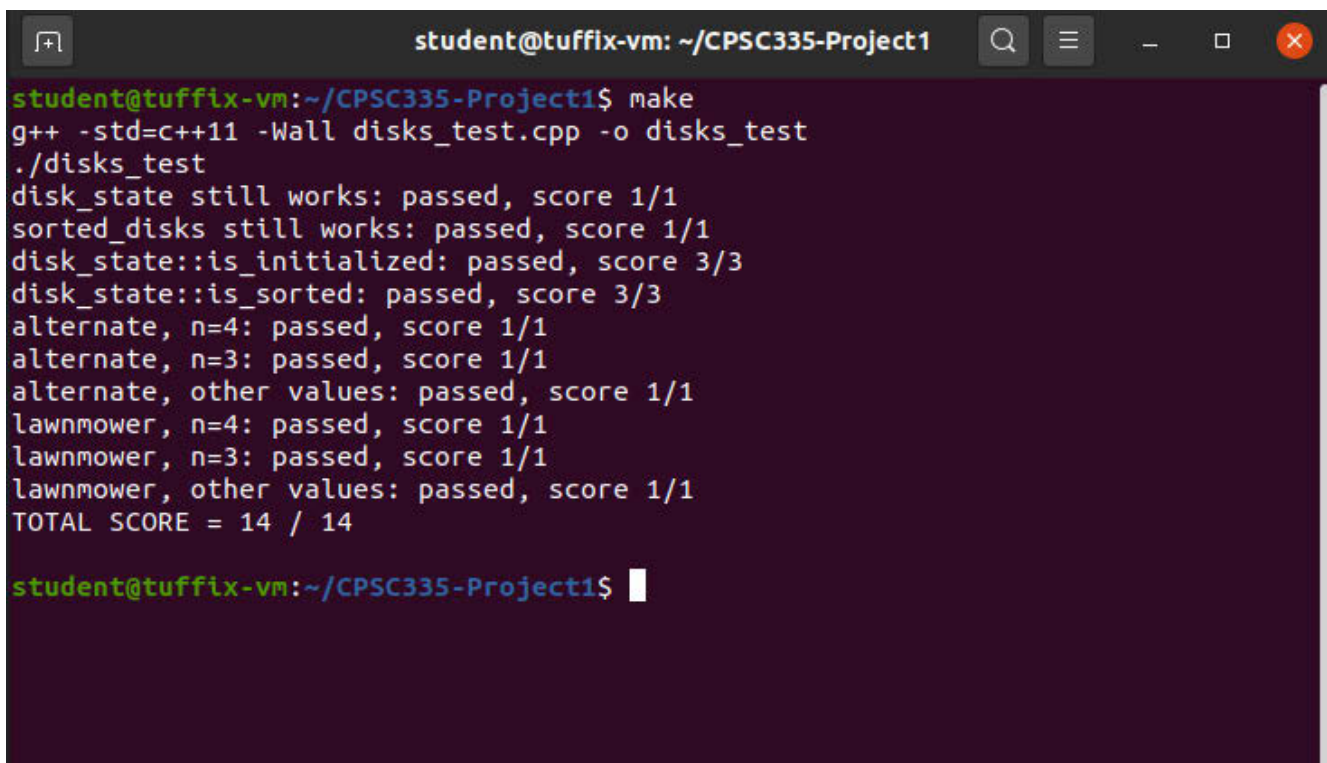# CPSC 335 Project 1

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CPSC335
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```
README.md
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```

```
student@tuffix-vm: ~/CPSC335-Project1

student@tuffix-vm:~/CPSC335-Project1$ make
g++ -std=c++11 -Wall disks_test.cpp -o disks_test
./disks_test
disk_state still works: passed, score 1/1
sorted_disks still works: passed, score 1/1
disk_state::is_initialized: passed, score 3/3
disk_state::is_sorted: passed, score 3/3
alternate, n=4: passed, score 1/1
alternate, n=3: passed, score 1/1
alternate, other values: passed, score 1/1
lawnmower, n=4: passed, score 1/1
lawnmower, n=3: passed, score 1/1
lawnmower, other values: passed, score 1/1
TOTAL SCORE = 14 / 14

student@tuffix-vm:~/CPSC335-Project1$
```

ALTERNATE ALGORITHM PSUEDOCODE

```
swaps = 0
for i=0 to n do
    for j=0 to 2n-1 do
        if disk[j] > disk[j+1]
            swap[j]
            swaps ++
```

STEP COUNT

```
SWAPS = 0                              → 1    tu
for i=0 to n                           → n+1      tu
    for j=0 to 2n-1                     → 2n      tu
        if disk[j] > disk[j+1]          → 3 tu
            swap[j]                     → 1 tu
            SWAP ++                     → 1 tu
```

$$2n \cdot 5 \cdot (n+1) + 1 = \boxed{10n^2 + 10n + 1}$$

IN THE ORDER OF $O(n^2)$

Lawnmower Algorithm
Pseudocode w/ step count and Big-O proof
——————————————————————————

LAWN MOVER ALGORITHM PSUEDOCODE

```
SWAPS = 0
 for i=0 to n/2
       ind = 0
       while ind < n-1
             if disk[ind] > disk[ind+1]
                   swap disks[ind]
                   swaps++
                   ind++
       while ind > 0
             if disk[ind] < disk[ind-1]
                   swap disks[ind-1]
                   swaps++
                   ind--
```

STEP COUNT

```
SWAPS = 0                              →  1 tu
for i=0 to n/2                         →  n/2+1 tu
   ind=0                               →  1 tu
  while ind < n-1                      →  n tu
      if disk[ind] > disk[ind+1]       →  3 tu
            SWAP disk[ind]             →  1 tu
            SWAPS ++                   →  1 tu
            ind++                      →  1 tu
   while ind >0                        →  n+1
      if disk[ind] < disk[ind-1]       →  3tu
            SWAP disk[ind-1]           →  1tu
            SWAPS ++                   →  1tu
            ind --                     →  1tu
```

$$\left((n+1)\cdot 6 + 6\cdot n\right)\cdot n/2 + 2$$

$$(12n+6)\left(n/2+2\right) = 6n^2 + 27n + 12$$

IN THE ORDER OF $O(n^2)$