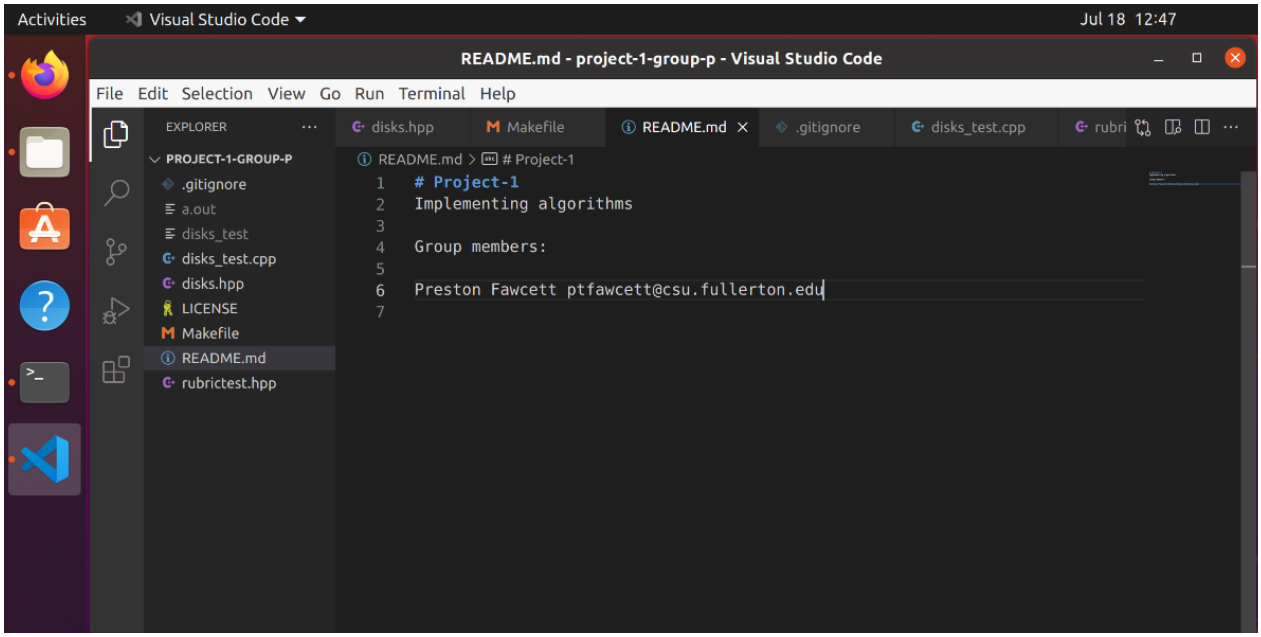
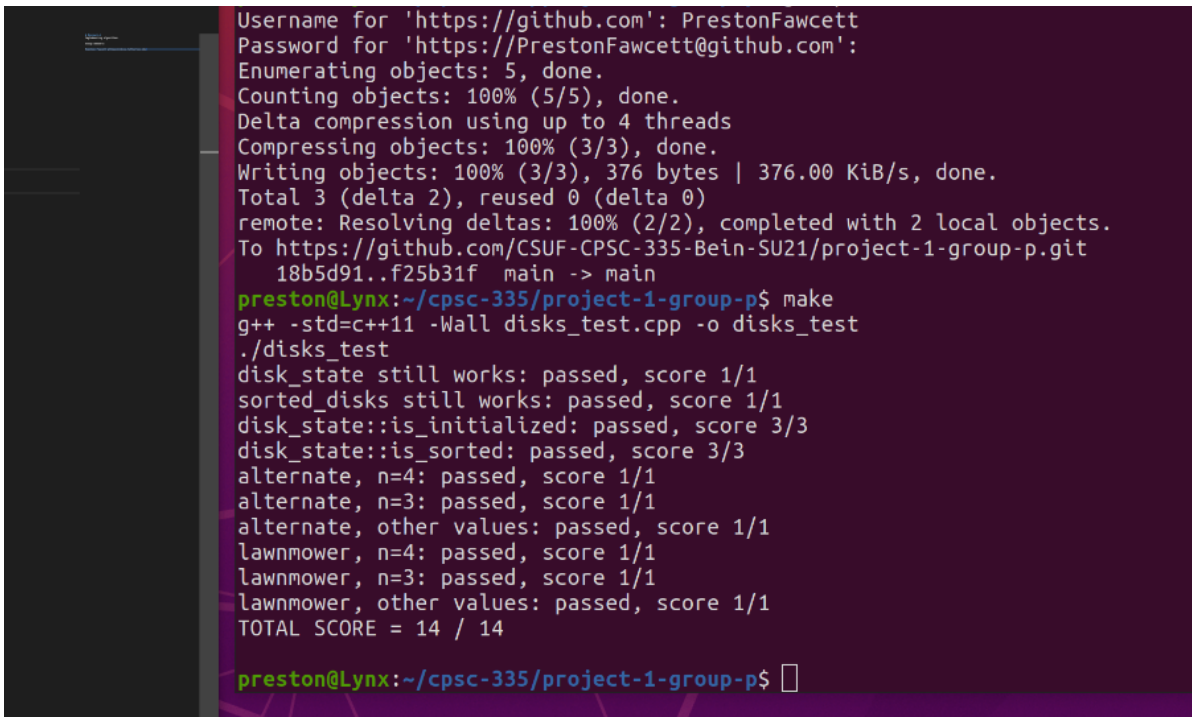
Project 1 - Implementing algorithms

Group members: Preston Fawcett - ptfawcett@csu.fullerton.edu





```
def sort_lawnmower()
        for i=1 to n/2 do                                          sc: n/2-1+1 = n/2
                for i=0 up to and not including total_count-1       sc: (2n-1)-0 = 2n-1
                        if list[i] == light && list[i+1] == dark   sc: 4 + max(4, 0) = 8
                                swap(i)                                    sc: 3
                                Swap_count++                               sc: 1
                for i=total_count-1 to and not including 0         sc: [0-(2n-1)]/-1 = 2n-1
                        if list[i-1] == light && list[i] == dark   sc: 4 + max(5, 0) = 9
                                swap(i-1)                                  sc: 4
                                Swap_count++                               sc: 1
        return sorted_disks
                n/2 * [(2n-1)*(8) + (2n-1)*(9)] = n/2 * (34n-17) = 17n^2-8n
```

Does $17n^2 - 8n$ belong to $O(n^2)$: $17n^2 - 8n <= C * n^2$
$C = 17 + 8 = 25$: $n = 1$
$17n^2 - 8n <= 25n^2$
$25n^2 - 17n^2 + 8n >= 0$
$8n^2 + 8n >= 0$
$16 >= 0$ **Yes, belongs to $O(n^2)$**

```
def sort_alternate()
        for i=1 to n do                                            sc: n - 1 + 1 = n
                for i=0 to and not including total_count-1 step by 2  sc: [(2n-1)-0]/2 = n
                        if list[i] == light && list[i+1] == dark   sc: 4 + max(4, 0) = 8
                                swap(i)                                    sc: 3
                                Swap_count++                               sc: 1
                for i=1 to and not including total_count-1 step by 2  sc: [(2n-1)-1]/2 = n-1
                        if list[i] == light && list[i+1] == dark   sc: 4 + max(4, 0) = 8
                                swap(i)                                    sc: 3
                                Swap_count++                               sc: 1
        return sorted_disks
                n * [(n)*(8) + (n-1)*(8)] = n * (16n-8) = 16n^2-8n
```

Does $16n^2 - 8n$ belong to $O(n^2)$: $16n^2 - 8n <= C * n^2$
$C = 16 + 8 = 24$: $n = 1$
$16n^2 - 8n <= 24n^2$
$24n^2 - 16n^2 + 8n >= 0$
$8n^2 + 8n >= 0$
$16 >= 0$ **Yes, belongs to $O(n^2)$**