

# EECS 233 HW2

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## 1 Program Output

### 1.1 Part C

```
Number of People: 3 Number of Traits: 7 Time: 266ms
Number of People: 4 Number of Traits: 7 Time: 609ms
Number of People: 5 Number of Traits: 7 Time: 1532ms
Number of People: 6 Number of Traits: 7 Time: 4597ms
Number of People: 7 Number of Traits: 7 Time: 135423ms
```

### 1.2 Part D

```
Number of People: 5 Number of Traits: 5 Time: 0ms
Number of People: 5 Number of Traits: 6 Time: 62ms
Number of People: 5 Number of Traits: 7 Time: 1579ms
Number of People: 5 Number of Traits: 8 Time: 77298ms
```

## 2 Part E

The difference between increases in number of people and number of traits becomes apparent when one is increased while the other remains static. In Part C, the number of traits (maxValue) remains constant, and the number of people ranges from 3-6. In Part D, the number of people remains constant while the number of traits ranges from 5-8. As the number of people exceeds 6 in Part C, the runtime increases dramatically. This is because the size of the array depends on the number of people, which impacts the number of permutations far more than adding another trait is in Part D.

### 3 Extra Credit Attempt

The difference between Part C and Part D is because of the way the permutations are generated with regard to the Big-O complexity. As the number of people increases, the size of the array needs to increase. As the Big O complexity is based on the factorial of the number of traits, a small increase will have a much greater impact than the relatively minimal impact on Big-O complexity caused by adding another trait, which just creates  $maxValue + 1$  more permutations.