Jane Street Symposium - Blotto

1. What's your entry?

District	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}
My Entry	37	3	4	5	6	7	8	9	10	11

2. How did you go about coming up with it?

High-level idea:

I simulated several of my own tournaments, and chose the strategy that performed the best on average. In each tournament, I randomly sampled a large number of competing submissions based on various strategies and played all combinations in head-to-head matchups. Some strategies used uniform sampling across districts, while others used front- or back-loaded biased sampling. I also included several deterministically-chosen submissions that I thought would be popular choices. I scored submissions based on the scoring rules outlined in the game description.

Some low-level details:

- Given that we are only allowed to place a whole number of resources in each district, some resource allocations are less "wasteful" than others, from an offensive-viewpoint. For example, placing 2 resources in district 10 will not win a vote in any situations where 1 resource will not. Furthermore, for district 10, the least-wasteful allocations are $\{0, 1, 11, 21, \ldots, 91\} = \{0\} \cup \{\, k \in \mathbb{N} | k \mod 10 = 1 \wedge k \leq 100\}$. Thus, since our objective is to play offensively, I made sure to simulate a number of submissions that followed this minimal-waste strategy. Ultimately, the submission that I chose also adheres to this strategy.
- I simulated submissions from the Dirichlet-multinomial distribution. I chose the shape parameter vector of the Dirichlet distribution according to the type of strategy I wanted to simulate.

3. Does it change if you are allowed decimal numbers of units?

Yes, I would makes some changes to my approach. First, the idea of least-wasteful allocations (mentioned above) no longer applies. Second, I would need to alter the sampling distributions for my simulations, or simply add some random noise to each submission.

That said, I would still employ a similar approach of simulating tournaments of strategically-biased random submissions. With more time, I would construct a larger tournament of tournament-winners as a genetic algorithm. In this algorithm, a tournament is a generation of species (submissions). Species are scored based on a fitness function (the scoring rules), and propagated to the next generation with probability proportional to their fitness. This approach would help to better explore a larger space of possible submissions.