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Parking Functions: Choose your own adventure

Consider a parking lot consisting of n consecutive parking spots along a one-way street labeled 1 to n. Suppose n cars want to park one at a time in the parking lot and each car has a preferred parking spot. Each car coming into the lot initially tries to park in its preferred spot. However, if a car's preferred spot is already occupied, then it will proceed forward in the street parking in the next available spot. Since the parking lot is along a one-way street, it is not guaranteed that every car will be able to park before driving past the parking lot. If we let a_i denote the preference of car i and all of the cars are able to park under these conditions, then the preference list $(a_1, a_2, \ldots, a_n)$ is called a parking function (of length n).

For example, (4,2,1,2,2) is a parking function, but (5,1,2,5,2) is not (you should convince yourself of this!). In this talk, we provide an answer to the question of how many parking functions of length n there are and we consider many new avenues for research stemming from this enumerative question. This talk will be in the style of a "Choose Your Own Adventure" book and the audience will make choices to dictate the routes we take.