Applications:

1. Centipede game

The centipede game is an extensive-form game in game theory in which two players alternately get a chance to take the larger share of a slowly increasing money stash. It is arranged so that if a player passes the stash to their opponent who then takes the stash, the player receives a smaller amount than if they had taken the pot.

The centipede game concludes as soon as a player takes the stash, with that player getting the larger portion and the other player getting the smaller portion. The game has a predefined total number of rounds, which are known to each player in advance.

Our Approach:

We ran a simulation of a game by predefining the max number of rounds and the increment in price pool with each round and calculated the price distribution as a function of round at which the player withdraws the prize.Through these distributions we calculated the mean amount the starting player and his opponent can get within a 95 percent confidence interval.

Code:
https://colab.research.google.com/drive/1DYpEy6GwYUfY1eE1aFgDfZ2RZTWDI8qA?usp=sharing

2. Traffic problem

Traffic flow analysis relies on three primary variables: Flow (q), Speed (v), and Density (k). Flow represents the number of vehicles passing a point per unit time, typically measured in vehicles per hour (vehicles/hour). Speed is the average speed of vehicles traveling on a road segment, measured in kilometers per hour (km/h) or miles per hour (mph). Density indicates the number of vehicles occupying a unit length of the road, measured in vehicles per kilometer (vehicles/km) or vehicles per mile (vehicles/mile). By analyzing these variables, traffic engineers can predict and manage traffic conditions.

Our Approach:

To utilize these variables and predict traffic flow, we can employ confidence intervals to estimate the range of expected values for each variable. For instance, if historical data shows that the flow at a particular road segment follows a certain pattern, we can calculate the mean flow and establish a 95% confidence interval around this mean. If the

observed flow exceeds the upper bound of this interval, it can be classified as crowded, indicating that the traffic volume is unusually high and potentially leading to congestion. Conversely, if the flow remains within or below the confidence interval, the traffic can be classified as not crowded. This approach allows traffic management systems to proactively identify and address potential congestion issues by dynamically adjusting traffic signals, opening additional lanes, or rerouting traffic to maintain smooth flow.

Group members:
Samanyu Arora
Vibhu Yadav
Anshika Agrawal
Palak Agarwal
Pragya Pathak