

# Pre-class work

Create a Google document and record all your work. **Make sure the Google document is shared** so that it can be assessed, and **be ready to paste a link to your document into a class poll**.

Play the betting game at <https://gamesfortraders.com/coin-challenge/>. The game works like this.

- A biased coin that comes up heads 60% of the time is flipped repeatedly.
- You start with \$250 and can bet any available amount of money on the next coin flip.
- Select Heads or Tails and how much money you want to bet.
- If you predicted the outcome of the coin flip correctly, you get back double your bet (if you bet \$10 you get back your original bet and an extra \$10).
- If you were wrong about the outcome you get back nothing (you lose the full amount you bet).

**Task:** Devise and describe a betting strategy to try and maximize the amount of money you end up with after 20 bets. Possible examples (these are not optimal)—

- Bet half your remaining money every time and always bet on heads.
- Place 2 bets on heads followed by 1 bet on tails, and always place a \$10 bet (or all your remaining money if you have less than \$10 left).

Explain why you think your strategy is a good way to maximize returns when betting on a 60% biased coin.

**Task:** Play the game at the link above using the betting strategy you described. Place a total of 20 bets (or fewer if you run out of money). Take a screenshot of the results when you are done.

**Be honest!** — Show the real results of applying your betting strategy to this game.

**Task:** Implement the coin flip game as well as your betting strategy in a Python simulation. Run the simulation at least 1000 times and plot a histogram of the amount of money you have left at the end. Use your results to estimate a 95% confidence interval of the amount of money you will have left at the end of 20 coin flips using your betting strategy.