Show Case 2: A Bidding Game

Rules of the game:

- **Pick a number**: Everyone in the class secretly picks an integer in the range of [1, 100]. In other words, you should not communicate with anyone else. Just pick a secrete number between and including 1 and 100—integer on your own choice.
- **Reward of the game**: The winning number is the one closest to two-thirds times the average in the class. The reward to the winner is **$100** minus the absolute value of the difference between the winning number and two-thirds of the average. If multiple persons pick the same winning number, the tie is broken by randomly picking only one person out of them as the sole winner to receive the reward.

Questions:

1. How much would you expect to gain from the game if everyone (including you) in the class just randomly picks a number?
2. What would be your strategy if everyone else just randomly picks a number? Explain why you think it is a good strategy. How much reward would you expect to get from the game?
3. Is your strategy for question 2 above still a good strategy if many (or even all) of the others in the class also use the same strategy in their minds too? How much reward would you expect to get from the game in this situation?
4. What would be your new strategy next time if everyone else just uses your old strategy in question 2 above? Explain why you think it is a good strategy. How much reward would you expect to get from the game?
5. Is your strategy for question 4 above still a good strategy if many (or even all) of the others in the class also use the same strategy in their minds too? How much reward would you expect to get from the game in this situation?
6. If we change the reward to the winner to **$10** minus the absolute value of the difference between the winning number and two-thirds of the average. Note that the winner actually could be lose money if he/she needs to pay back money when the reward is negative. What would be your answers to questions 1 and 2?
7. According to chapter 1 in ***Strategies and Games***, we are interested in investigating games with four key components (group, interaction, rationality, and strategy). Examine the number game above and explain what each of the four key components (group, interaction, rationality, and strategy) mean in the context of this number game.