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 as your bid and submit it to the host in charge.

- **Reward of the game**:
    - Let u denotes the average of the numbers submitted by the class. Let $t = (2/3)* u$ denote a special target number determined by the bids.
    - The winner is the person who bids a number closest to t. Let w denotes this winning number. If multiple persons pick the same winning number, the tie is broken by the alphabetical order of their IDs.
    - The reward to the winner is **100** - | w-t |. In other words, the closer the winning bid is to the target, the higher the reward is for the winner.

Questions:

1. What would be your strategy if everyone else just randomly picks a number? Explain why you think it is a good strategy.
2. Is your strategy for question 2 above still a good strategy if the others in the class also use the same strategy too?
3. What would be your new strategy next time if everyone else just uses your old strategy in question 2 above?
4. Is your strategy for question 3 above still a good strategy if the others in the class also use the same strategy too?
5. 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 lose money if he/she needs to pay back money when the reward is negative. Would that affect your answers above?
6. 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.