1. Question — Please name the bias (if any) in the following scenarios:

    1. Average household income at the neurosurgeon's Christmas party represents the overall average income
    2. Three college dropouts became billionaires (Steve Jobs, Bill Gates, Mark Zuckerberg) → Dropping out will make me a billionaire Survivorship
    3. Our competitor has a new online presence and their sales increased by 50%
    4. You are implementing a new app and ask your close relatives for feedback

    Answer :

    1. Selection Bias: Neurosurgeon's and their colleagues have an annual income way higher than the average, thus this average will not represent the whole population
    2. Survivorship Bias: Against 3 billionaires there are thousands of people who did not succeed and maybe would have achieved more if they did not drop out.
    3. Survivorship Bias: Maybe they also have a new manager or better sales department.
    4. Convenience Bias / Selection Bias

2. Question — A dice (1-6) is thrown 10 times and the sum of the 10 rolls is noted.

    1. What is the expected sum?
    2. What is the distribution?
    3. If you repeat this game 10,000 times and note the sum each time, what is the distribution of the sums?
    4. What distribution should you consider if you repeat this game only 15 times?
    5. How many degrees of freedom exist?

    Answer :

    1. The expected sum is $10 * \sum_{i=1}^{6} \frac{1}{6} i$ =10*3.5 = 35
    2. Discrete Uniform Distribution

3. According to the Central Limit Theorem, the sums should be normally distributed

4. As the sample size is small, the Student's t-distribution should be used

5. For a sample size of 15, there are 14 dof.