For each of the following scenarios, call out the potential biases in the proposed experiment. Do your best to try to discover not only the bias, but the initial design. There is plenty of room for interpretation here, so make sure to state what assumptions you're making.

a) the sampling procedure, b) the assignment to conditions procedure, c) the context of the study, or d) the people running the study.

* You're testing advertising emails for a bathing suit company and you test one version of the email in February and the other in May.
* You open a clinic to treat anxiety and find that the people who visit show a higher rate of anxiety than the general population.

It depends where the clinic is located. Because the people who come to that clinic are not representatives of the general population, more anxious people may be residing there. So, it doesn’t work if I open the clinic somewhere else. To compare the general population and people who visit the clinic. I can take equal samples randomly selected from different period of times and see whether there is a statistically significant difference. It will be biased to only use 2 weeks data and conclude like that, the study should have samples selected from all periods of time, like every two weeks data for one year. A popular doctor, well known for calming down psychological problems is likely to be visited by many people from all over the country. So being visited by anxious people may not imply the clinic is perfectly doing its job in curing mental problems. Anticipating possible revenue, I may be opted to open new branch somewhere else, but may not see the same higher rate.

* You launch a new ad billboard-based campaign and see an increase in website visits in the first week.

Advertisements can have immediate effect or some take long time to attract users. I assume business want long lasting profits and it can be related to website visits so it is not possible to conclude that the new ad attracted more customers though it may work for a week. The experiment can be done in this way: take random sample from a population (possibly people who never visited the website or have similar behavior in different way), send targeted ads to one group of people and send none to others. See if those people who viewed the ad visited the website. The other issue to consider is if the add is forcing people to click on it, directing them to the website and they do nothing but close and move on with their lives.

* You launch a loyalty program but see no change in visits in the first week.

The business has customers and it launched a loyalty program in which buying more items is rewarding. Selecting sample customers randomly is important here. An AA test will help ensure the similarity of groups or fix some threshold difference. The behavior of the two groups will be studied before and after the launch. We may have ample amount of data about customers before the launch but only one week after the launch. Therefore, to correctly study the effect of the program giving more time is required. The person who undertook this study may not have measured number of visits before the launch if he had number of visits might have slightly or significantly increased. The behavior of customers in the first week is not representative of their behavior afterwards.