1. You work at an e-commerce company that sells three goods: widgets, doodads, and fizzbangs. The head of advertising asks you which they should feature in their new advertising campaign. You have data on individual visitors' sessions ([activity on a website](https://en.wikipedia.org/wiki/Session_(web_analytics)), [pageviews](https://en.wikipedia.org/wiki/Page_view), and purchases), as well as whether or not those users [converted](https://en.wikipedia.org/wiki/Conversion_marketing) from an advertisement for that session. You also have the cost and price information for the goods.

Ans: Create three different mini-ad campaigns, one for each product. Run each one and collect data for a set, large enough number of impressions. For the three different campaigns, we can then compare the data for time spent on the website, whether they clicked on the ad or not, and, for those who did, whether they eventually purchased the item or not. From the normalized impression data, we can infer an average resulting revenue and associated profit, thus the yield from each ad for a given number of impressions can be determined.

2. You work at a web design company that offers to build websites for clients. Signups have slowed, and you are tasked with finding out why. The [onboarding funnel](https://en.wikipedia.org/wiki/Funnel_analysis) has three steps: email and password signup, plan choice, and payment. On a user level you have information on what steps they have completed as well as timestamps for all of those events for the past 3 years. You also have information on [marketing spend](https://en.wikipedia.org/wiki/Marketing_spending) on a weekly level.

Ans: Compare the time between steps for the past 3 years’ worth of data. Plot this trend for the inter-time between each of these steps. Examine the mean and variance for each, and view these trends. Identify whether there is any change in:

a- The number of email and password signups

b- The time between steps

c- Other aspects of the process, i.e. time of day.

d- Marketing spend throughout the period, and the correlation between this and te number of signups.

3. You work at a hotel website and currently the website ranks search results by price. For simplicity's sake, let's say it's a website for one city with 100 hotels. You are tasked with proposing a better ranking system. You have session information, price information for the hotels, and whether each hotel is currently available.

Create a model for ‘quality’ of a hotel based on some combination of availability, price, and session details.

4. You work at a social network, and the management is worried about [churn](https://en.wikipedia.org/wiki/Churn_rate) (users stopping using the product). You are tasked with finding out if their churn is atypical. You have three years of data for users with an entry for every time they've logged in, including the timestamp and length of session.

Ans: Look for any trends in user sessions, and whether there is any pattern to the way in which user behavior changes or dovetails before they quit the service. If such a behavioral trend exists, this may indicate that users are generally becoming bored or dissatisfied after a certain period of time.