

Probability Take Home Questions 2

1. **Quant Interview:** A quant driven hedge fund wants to interview all the UCLA MFE students for an internship. Say 50% of all students who received their first interview received a second interview. 95% of the people interviewed that got a second interview said they had a good first interview. 75% of the people interviewed that did not get a second interview said they had a good first interview. If you felt you had a good first interview, what is the probability that you will receive a second interview? Alternatively, if you felt you had a bad first interview, what is the probability that you will receive a second interview?
2. **Hypothesis Testing:** There are two biased coins A and B in a bag. Probability of heads for coin A is 0.75 and the probability of heads for coin B is 0.3. You pick a coin randomly and perform 10 tosses (without knowing which coin you picked). *Hint:* To solve the two problems below, compute the posterior probability $P(\text{Hypothesis}|\text{Data})$ and argue that one of the coin has a higher posterior probability. You will have to test and compare the two hypothesis - picking coin A given data and picking coin B given data. Since we are choosing a coin randomly, $P(\text{picking coin A}) = P(\text{picking coin B}) = 1/2$. Key takeaway is how the data changes your beliefs about which coin you picked.
 - (a) You observe that you get 8 heads and 2 tails from your coin tosses. What is the probability that you picked coin A from the bag given the data. Compare this with the posterior probability of picking the other coin.
 - (b) Now, say you observed 8 tails and 2 heads from your coin tosses. What is the probability that you picked coin B given the data. Compare this with the posterior probability of picking the other coin.