

Introduction to Probability

STAT-UB.0103 – Statistics for Business Control and Regression Models

Sample Points and Sample Spaces

1. In the following two experiments, what are the sample points and the sample space?
 - (a) You flip a coin.

 - (b) You roll a 6-sided die.

2. Suppose that a customer visits a restaurant and leaves a review on Yelp with 1–5 stars. What are the sample points and the sample space for the customer's star rating?

3. Suppose that two customers visit a restaurant, and that they both leave Yelp reviews with 1–5 stars each. What are the sample points and the sample space for the pair of star ratings?

4. Suppose you randomly pick a respondent from the class survey, then record their major and gender. What are the sample points and the sample space?

Events

5. Suppose that a customer leaves a Yelp rating (1–5 stars) for a restaurant. Describe the event “the rating is odd (not even).”

6. Suppose you randomly pick a respondent from the class survey, then record their major and gender. Assume that gender is listed as Male or Female, and that major is listed as Finance, Other, or Undecided.
 - (a) Describe the event “the major is Undecided.”

 - (b) Describe the event “the gender is Male.”

Probability

7. Suppose you randomly pick a respondent from the class survey and record their major and gender.
 - (a) Use the following table of recorded survey response frequencies to compute the probabilities of the sample points.

Major	Gender		Total
	Female	Male	
Finance	12	20	32
Other	4	3	7
Undecided	10	15	25
Total	26	38	66

- (b) Find the probabilities of the events in problem 6.

8. Suppose that a customer's Yelp rating is random, and that the probabilities for the possible star ratings are $p_1 = 10\%$, $p_2 = 30\%$, $p_3 = 25\%$, $p_4 = 20\%$, $p_5 = 15\%$. Find the probability of the event in problem 5.

Compound Events and the Additive Rule

9. Suppose you pick a random survey respondent and record their major and gender.
- (a) Describe the event “the major is Undecided or the gender is Male.”
- (b) Compute the probability of the event in part (a) by adding the probabilities of all of the sample points in the event.
- (c) Compute the probability of the event in part (a) by using the additive rule.

10. Suppose that two customers give ratings (1–5 stars) to the same restaurant on Yelp.

(a) Describe the event “at least one customer gives a 1 star rating”.

(b) Suppose that both customers randomly assign their ratings, giving equal probabilities to all possible star ratings. In this case, all 25 sample points have equal probability. Compute the probability of the event in part (a).

11. Suppose that two customers give ratings to the same restaurant on Yelp.

(a) Describe the event “the average of their ratings is 3.5 or 4”.

Hint: this is the same event as “the sum of their ratings is 7 or 8.”

(b) As in problem 10(b), suppose that both customers randomly assign their ratings with equal probability for all possible star ratings, so that all 25 sample points have equal probability. Compute the probability of the event in part (a).