

Econ 325 Section 001
Assignment 2

The due date is Tuesday, September 24 before the class starts.

1. Prove that, if $A \subset B$, then $P(A) \leq P(B)$. [Hint: Apply the addition rule to $B = (B \cap A) \cup (B \cap \bar{A})$ and note that $(B \cap A)$ and $(B \cap \bar{A})$ are mutually exclusive, i.e., $(B \cap A) \cap (B \cap \bar{A}) = \emptyset$. Use also $A \cap B = A$ when $A \subset B$.]

2. Prove that, for any two sets A and B , $P(A \cap B) \geq P(A) + P(B) - 1$. [Hint: Use $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ and $P(A \cup B) \leq 1$.]

3. Suppose that $P(A) = 0.30$, $P(B|A) = 0.60$, and $P(B|\bar{A}) = 0.60$, where \bar{A} and \bar{B} are complement of A and B , respectively. What is the probability of $P(\bar{A}|\bar{B})$?

4. A manger has a pool of eight employees and will assign two out of eight employees to a project-monitoring task. Four of the employees are women and four are men. Two of the men are brothers. The manager is to make the assignment at random so that each of the eight employees is equally likely to be chosen. Let A be the event “Both of chosen employees are men” and B the event “Chosen employees are two brothers.”
 - (a) Find the probability of A .
 - (b) Find the probability of B .
 - (c) Find the probability of the intersection of A and B .

5. There is a new diagnostic test for a disease that occurs in about 0.05 percent of the population. The test will detect a person with the disease 99 percent of the time when a person has the disease. It will, however, say falsely that a person without the disease has the disease about 3 percent of the time. Suppose that the test conducted on a randomly selected person indicates that this person has the disease. What is the probability that this person has the disease.

6. Given the following table, what is the probability that a randomly selected person is female conditional on the selected person does not support US policy in Iraq?

	US Policy in Iraq		Row Total
	Support	Doesn't Support	
Female	0.2438	0.2862	0.53
Male	0.3762	0.0938	0.47
Column Total	0.62	0.38	1.00

7. In a recent survey of consumer confidence, 160 respondents were classified by their level of education. The results of the survey are presented below.

		Education		
		High School	Some College	College
Confidence	Medium	13	17	15
	Fair	27	22	13
	High	32	14	7

- (a) What proportion of respondents had at least “some college” education and had “high confidence”?
- (b) What is the conditional probability of having “high confidence” conditional on having a “college” education?
- (c) Are the events had a “college” education and had “high confidence” statistically independent?