

IE 230 <i>Introduction to Probability and Statistics</i> <i>Spring 2017</i>	ÇANKAYA UNIVERSITY Faculty of Engineering <hr/> Department of Industrial Engineering
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HOMEWORK # 1
Due date: 14.03.2017 @11:30

1. Disks of polycarbonate plastic from a supplier are analyzed for scratch and shock resistance. The results from 100 disks are summarized here:

		Shock Resistance	
		High	Low
Scratch Resistance	High	70	10
	Low	15	5

Let A denote the event that a disk has high shock resistance, and let B denote the event that a disk has high scratch resistance. Determine the number of disks in $A \cap B$, A' , and $A \cup B$.

2. Counts of the Web pages provided by each of two computer servers in a selected hour of the day are recorded. Let A denote the event that at least 15 pages are provided by server 1, and let B denote the event that at least 20 pages are provided by server 2. Describe the sample space for the numbers of pages for the two servers graphically in x vs to y plot. Show each of the following events on the sample space graph:
- a. A
 - b. B
 - c. $A \cap B$
 - d. $A \cup B$
3. In the design of an electromechanical product, 10 components are to be stacked into a cylindrical casing in a manner that minimize the impact of shocks. One end of the casing is designated as the bottom and the other end is the top.
- a. If all components are different, how many different designs are possible?
 - b. If seven components are identical to one another, but the others are different, how many different designs are possible?

- c. If three components are of one type and identical to one another, and four components are of another type and identical to one another but the others are different, how many different designs are possible?

4. Strands of copper wire from a manufacturer are analyzed for strength and conductivity. The results from 100 strands are as follows:

	Strength	
	High	Low
High conductivity	74	10
Low conductivity	15	1

- a. If a strand is randomly selected, what is the probability that its conductivity is high and its strength is high?
- b. If a strand is randomly selected, what is the probability that its conductivity is low or its strength is low?
- c. Consider the event that a strand has low conductivity and the event that the strand has low strength. Are these two events mutually exclusive?

5. A maintenance firm has gathered the following information regarding the failure mechanisms for air conditioning systems:

		Evidence of Gas Leaks	
		Yes	No
Evidence of electrical failure	Yes	70	19
	No	38	5

The units without evidence of gas leaks or electrical failure showed other types of failure. If this is a representative sample of AC (alternative current) failure, find the probability

- a. That failure involves a gas leak
- b. That there is evidence of electrical failure given that there was a gas leak
- c. That there is evidence of a gas leak given that there is evidence of electrical failure.

6. In the 2004 presidential election, exit pools from the critical state of Ohio provided the following results:

Total	Bush, 2004	Kerry, 2004
No college degree (62%)	50%	50%
College graduate (38%)	52%	48%

What is the probability a randomly selected respondent voted for Bush?