Chapter 2: Probability

1. A bin of 50 parts contains 3 defectives and 47 nondefective parts. A sample of 6 parts is selected from the 50 without replacement.

a) How many ways to get a sample of size 6 which contains 2 defective parts?
b) What is the probability that exactly 2 defective parts are selected in the sample?

2. There are 10 computers in a store. Among them, 7 are brand new and 3 are refurbished. Four computers are purchased for a student lab. They are indistinguishable, so the four computers are selected at random. How many possibilities that among the chosen computers, two are refurbished?

3. Suppose that a batch of 50 parts contains 10 parts from tool 1 and 40 parts from tool 2. If two parts are selected randomly, without replacement.

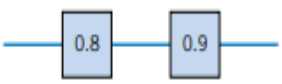
a) What is the conditional probability that a part from tool 2 is selected second given that a part from tool 1 is selected first?

b) What is the probability that the second part came from tool 2 and the first part came from tool 1?

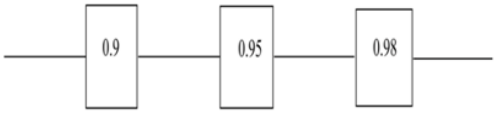
4. The probability that the first stage of a numerically controlled machining operation for high-rpm pistons meets specifications is 0.90. Failures are due to metal variations, fixture alignment, cutting blade condition, vibration, and ambient environmental conditions. Given that the first stage meets specifications, the probability that a second stage of machining meets specifications is 0.95. What is the probability that both stages meet specifications?

5. The following circuit operates only if there is a path of functional devices from left to right. The probability that each device functions is shown on the graph. Assume that devices fail independently. What is the probability that the circuit operates?

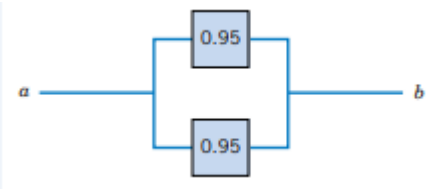
a)



b)



c)



6. An experiment involves tossing a pair of dice, 1 black and 1 pink and recording the numbers that come up. Find the probability that number 3 occurs on either dice.

7. An insurance company offers four different deductible levels none, low, medium, and high for its homeowner's policyholders and three different levels low, medium, and high for its automobile policyholders. The accompanying table gives proportions for the various categories of policyholders who have both types of insurance. For example, the proportion of individuals with both low homeowner's deductible and low auto deductible is 0.06 (6% of all such individuals).

	Homeowner's			
Auto	N	L	M	H
L	0.04	0.06	0.05	0.03
M	0.07	0.10	0.20	0.10
H	0.02	0.03	0.15	0.15

Suppose an individual having both types of policies is randomly selected.

a. What is the probability that the individual has a medium auto deductible and a high homeowner's deductible?

b. What is the probability that the individual has a low auto deductible?

c. What is the probability that the individual is in the same category for both auto and homeowner's deductibles?

d. What is the probability that the two categories are different?

e. What is the probability that the individual has at least one low deductible level?

f. What is the probability that neither deductible level is low?

8. The breakdown of workers in a particular state according to their political affiliation and type of job held is shown here. Suppose a worker is selected at random within the state and the worker's political affiliation and type of job are noted.

Political Affiliation

		Republican	Democrat	Independent
Type of job	White collar	9%	20%	19%
	Blue Collar	15%	18%	19%

Given the worker is a Democrat, what is the probability that the worker is in a white collar job.

9. You have six unread mysteries and six unread science fiction books on your bookshelf. The first three of each type are hardcover, and the last three are paperback. Consider randomly selecting one of the six mysteries and one of the six science fiction books to take on a post-finals vacation. What is the probability of the event A that both selected books are paperbacks?

10. Consider a family of three childrens. Find the probabilities P(two boys | first born is a boy).