1. A survey of local car dealers revealed that 64% of all cars sold last month had CD players, 28% had alarm systems, and 22% had both CD players and alarm systems.
   a. What is the probability one of these cars selected at random had neither a CD player nor an alarm system?

   b. What is the probability that a car had a CD player unprotected by an alarm system?

   c. What is the probability a car with an alarm system had a CD player?

   d. Are having a CD player and an alarm system disjoint events? Explain.

2. All airline passengers must pass through security screenings, but some are subjected to additional searches as well. Some travelers who carry laptops wonder if that makes them more likely to be searched. Data for 420 passengers aboard a cross-country flight are summarized in the table shown. Does it appear that being subjected to an additional search is independent of carrying a laptop computer? Explain.
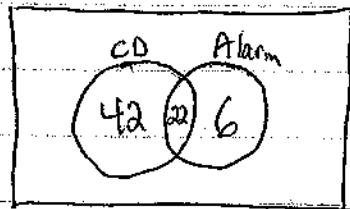
	Searched?		
	Yes	No	Total
Laptop	30	42	72
No laptop	145	203	348
Total	175	245	420

3. For purposes of making on-campus housing assignments, a college classifies its students as Priority A (seniors), Priority B (juniors), and Priority C (freshmen and sophomores). Of the students who choose to live on campus, 10% are seniors, 20% are juniors, and the rest are underclassmen. The most desirable dorm is the newly constructed Gold dorm, and 60% of the seniors elect to live there. 15% of the juniors also live there, along with only 5% of the freshmen and sophomores. What is the probability that a randomly selected resident of the Gold dorm is a senior? Show your work clearly on the back of this page.

1. A survey of families revealed that 58% of all families eat turkey at holiday meals, 44% eat ham, and 16% have both turkey and ham to eat at holiday meals.
   a. What is the probability that a family selected at random had neither turkey nor ham at their holiday meal?

   b. What is the probability that a family selected at random had only ham without having turkey at their holiday meal?

   c. What is the probability that a randomly selected family having turkey had ham at their holiday meal?

   d. Are having turkey and having ham disjoint events? Explain.

2. Many school administrators watch enrollment numbers for answers to questions parents ask. Some parents wondered if preferring a particular science course is related to the student's preference in foreign language. Students were surveyed to establish their preference in science and foreign language courses. Does it appear that preferences in science and foreign language are independent? Explain.

	Chemistry	Physics	Biology	Total
French	16	10	8	34
Spanish	35	23	44	102
Total	51	33	52	136

3. For purposes of making budget plans for staffing, a college reviewed student's year in school and area of study. Of the students, 22.5% are seniors, 25% are juniors, 25% are sophomores, and the rest are freshmen. Also, 40% of the seniors major in the area of humanities, as did 39% of the juniors, 40 % of the sophomores, and 36% of the freshmen. What is the probability that a randomly selected humanities major is a junior? Show your work.

Solutions ch.15

1. First lets look at the Venn Diagram

(CD: 42, overlap: 22, Alarm: 6)

a] $1 - P(\text{either}) = 1 - .70 = .3 = 30\%$.

b] $P(CD \cap A^c) = $ look at the venn diagram
.42 are in the C.D. but no alarm space.

c] $P(CD|A) = \dfrac{P(CD \cap A)}{P(A)} = \dfrac{.22}{.28} = .7857$

D] No ~~Some~~ a cars have both
$P(A \cap CD) \neq 0$.

2. Is $P(\text{Searched} | \text{laptop}) = P(\text{Searched})$?

$$\dfrac{P(\text{Searched} \cap \text{laptop})}{P(\text{laptop})} \overset{?}{=} P(\text{Searched})$$

$$\dfrac{\frac{30}{420}}{\frac{72}{420}} \overset{?}{=} \dfrac{175}{420}$$

→ Since the conditional prob. equals the single event prob. we can say that being searched and carrying a laptop are independent events.

$.41\overline{6} = .41\overline{6}$

3. "With all these percents, it may be easier to use real numbers"

Suppose 1000 people live on Campus

10% of $1000 = 100$ Seniors live on Campus
20% of $1000 = 200$ Juniors live on Campus
70% of $1000 = 700$ Underclassmen live on Campus

Now

60% of $100 = 60$ Seniors live Gold
15% of $200 = 30$ Juniors live Gold
5% of $700 = 35$ Under. live Gold

We want to know $P(S|G)$

$$= \frac{P(S \cap G)}{P(G)} = \frac{\frac{60}{1000}}{\frac{125}{1000}} = .48$$

* the Back of the sheet should be similar.