

Chapter 4 (CONT)

31. a. $P(A \cap B) = 0$

b. $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0}{.4} = 0$

c. No. $P(A|B) \neq P(A)$; \therefore the events, although mutually exclusive, are not independent.

d. Mutually exclusive events are dependent.

32. a. Total sample size = 2000

Dividing each entry by 2000 provides the following joint probability table.

Age	Health Insurance		
	Yes	No	Total
18 to 34	.375	.085	.46
35 and over	.475	.065	.54
	.850	.150	1.00

Let A = 18 to 34 age group

B = 35 and over age group

Y = Insurance coverage

N = No insurance coverage

b. $P(A) = .46$

$P(B) = .54$

Of population age 18 and over

46% are ages 18 to 34

54% are ages 35 and over

c. $P(N) = .15$

d. $P(N|A) = \frac{P(N \cap A)}{P(A)} = \frac{.085}{.46} = .1848$

e. $P(N|B) = \frac{P(N \cap B)}{P(B)} = \frac{.065}{.54} = .1204$

$$f. \quad P(A|N) = \frac{P(A \cap N)}{P(N)} = \frac{.085}{.150} = .5677$$

- g. Probability of no health insurance coverage is .15. A higher probability exists for the younger population. Ages 18 to 34: .1848 or approximately 18.5% of the age group. Ages 35 and over: .1204 or approximately 12% of the age group. Of the no insurance group, more are in the 18 to 34 age group: .5677, or approximately 57% are ages 18 to 34.

39. a. Yes, since $P(A_1 \cap A_2) = 0$

b. $P(A_1 \cap B) = P(A_1)P(B | A_1) = .40(.20) = .08$

$$P(A_2 \cap B) = P(A_2)P(B | A_2) = .60(.05) = .03$$

c. $P(B) = P(A_1 \cap B) + P(A_2 \cap B) = .08 + .03 = .11$

d. $P(A_1|B) = \frac{.08}{.11} = .7273$

$$P(A_2|B) = \frac{.03}{.11} = .2727$$

41. S_1 = successful, S_2 = not successful and B = request received for additional information.

a. $P(S_1) = .50$

b. $P(B | S_1) = .75$

c. $P(S_1|B) = \frac{(.50)(.75)}{(.50)(.75) + (.50)(.40)} = \frac{.375}{.575} = .65$