

noted that 48% of engaged workers strongly agreed with the statement “My current job brings out my most creative ideas.” Only 20% of the not engaged workers and 3% of the actively disengaged workers agreed with this statement (data extracted from M. Nink, “Employee Disengagement Plagues Germany,” *Gallup Management Journal*, gmj.gallup.com, April 9, 2009). If a worker is known to strongly agree with the statement “My current job brings out my most creative ideas,” what is the probability that the worker is engaged?

4.50 Sport utility vehicles (SUVs), vans, and pickups are generally considered to be more prone to roll over than cars. In 1997, 24.0% of all highway fatalities involved rollovers; 15.8% of all fatalities in 1997 involved SUVs, vans, and pickups, given that the fatality involved a rollover. Given that a rollover was not involved, 5.6% of all fatalities involved SUVs, vans, and pickups (data extracted from A. Wilde Mathews, “Ford Ranger, Chevy Tracker Tilt in Test,” *The Wall Street Journal*, July 14, 1999, p. A2). Consider the following definitions:

A = fatality involved an SUV, van, or pickup
 B = fatality involved a rollover

- Use Bayes’ theorem to find the probability that a fatality involved a rollover, given that the fatality involved an SUV, a van, or a pickup.
- Compare the result in (a) to the probability that a fatality involved a rollover and comment on whether SUVs, vans, and pickups are generally more prone to rollover accidents than other vehicles.

4.51 Enzyme-linked immunosorbent assay (ELISA) is the most common type of screening test for detecting the HIV virus. A positive result from an ELISA indicates that the HIV virus is present. For most populations, ELISA has a high degree of sensitivity (to detect infection) and specificity (to detect noninfection). (See HIVInSite, at HIVInsite.ucsf.edu.) Suppose the probability that a person is infected with the HIV virus for a certain population is 0.015. If the HIV virus is actually present, the probability that the ELISA test will give a positive result is 0.995. If the HIV virus is not actually present, the probability of a positive result from an ELISA is 0.01. If the ELISA has given a positive result, use Bayes’ theorem to find the probability that the HIV virus is actually present.

TEAM PROJECT

The file **Bond Funds** contains information regarding three categorical variables from a sample of 180 mutual funds. The variables include

- Type—Bond fund type (intermediate government or short term corporate)
- Fees—Sales charges (no or yes)
- Risk—Risk-of-loss factor of the mutual fund (below average, average, or above average)

4.52 Construct contingency tables of type and fees, type and risk, and fees and risk.

- For each of these contingency tables, compute all the conditional and marginal probabilities.
- Based on (a), what conclusions can you reach about whether these variables are independent?

STUDENT SURVEY DATABASE

4.53 Problem 2.117 on page 65 describes a survey of 50 undergraduate students (see the file **UndergradSurvey**). For these data, construct contingency tables of gender and major, gender and graduate school intention, gender and employment status, class and graduate school intention, class and employment status, major and graduate school intention, and major and employment status.

- For each of these contingency tables, compute all the conditional and marginal probabilities.
- Based on (a), what conclusions can you reach about whether these variables are independent?

4.54 Problem 2.117 on page 65 describes a survey of 50 undergraduate students (stored in **UndergradSurvey**).

- Select a sample of 50 undergraduate students at your school and conduct a similar survey for those students.
- For your data, construct contingency tables of gender and major, gender and graduate school intention, gender and employment status, class and graduate school intention, class and employment status, major and graduate school intention, and major and employment status. For each of these contingency tables, compute all the conditional and marginal probabilities.
- Based on (b), what conclusions can you reach about whether these variables are independent?
- Compare the results of (c) to those of Problem 4.53 (b).

4.55 Problem 2.119 on page 65 describes a survey of 40 MBA students (stored in **GradSurvey**). For these data, construct contingency tables of gender and graduate major, gender and undergraduate major, gender and employment status, graduate major and undergraduate major, and graduate major and employment status.

- For each of these contingency tables, compute all the conditional and marginal probabilities.
- Based on (b), what conclusions can you reach about whether these variables are independent?

4.56 Problem 2.119 on page 65 describes a survey of 40 MBA students (stored in **GradSurvey**).

- Select a sample of 40 MBA students from your MBA program and conduct a similar survey for those students.
- For your data, construct contingency tables of gender and graduate major, gender and undergraduate major, gender and employment status, graduate major and undergraduate major, and graduate major and employment status. For each of these contingency tables, compute all the conditional and marginal probabilities.
- Based on (b), what conclusions can you reach about whether these variables are independent?
- Compare the results of (c) to those of Problem 4.55 (b).