

1. Lie detectors are controversial instruments, barred from use as evidence in many courts. Nonetheless, many employers use lie detector screening as part of their hiring process in the hope that they can avoid hiring people who might be dishonest. There has been some research, but no agreement, about the reliability of polygraph tests. Based on this research, suppose that a polygraph can detect 65% of lies, but incorrectly identifies 15% of true statements as lies. A company believes that 95% of its job applicants are trustworthy. The company gives everyone a polygraph test, asking, "Have you ever stolen anything from your place of work?" Naturally, all the applicants answer "No," but the polygraph identifies some of those answers as lies, making the person ineligible for a job. What's the probability that a job applicant rejected under suspicion of dishonesty was actually trustworthy?

2. Dan's Diner employs three dishwashers. Al washes 40% of the dishes and breaks only 1% of those he handles. Betty and Chuck each wash 30% of the dishes, and Betty breaks only 1% of hers, but Chuck breaks 3% of the dishes he washes. (he, of course, will need a new job soon...). You go to Dan's for dinner one night and hear a dish break at the sink. What is the probability that Chuck is on the job?

3. A company's records indicate that on any given day about 1% of their day shift employees and 2% of the night shift employees will miss work. Sixty percent of the employees work the day shift.

- (a) Is absenteeism independent of shift worked? Explain.
- (b) What percent of employees are absent on any given day?

4. A private college report contains these statistics:

*70% of incoming freshmen attended public schools.*

*75% of public school students who enroll as freshmen eventually graduate.*

*90% of other freshmen eventually graduate*

(a) Is there any evidence that a freshman's chances to graduate may depend upon what kind of school the student attended? Explain.

(b) What percent of freshmen eventually graduate?

5. In July 2005 the journal *Annals of Internal Medicine* published a report on the reliability of HIV testing. Results of a large study suggested that among people with HIV, 99.7% of tests conducted were (correctly) positive, while for people without HIV 98.5% of the tests were (correctly) negative. A clinic serving an at-risk population offers free HIV testing, believing that 15% of the patients may actually carry HIV. What is the probability that a person testing negative is truly free of HIV?