

## **EXTRA PROBLEM 10: THEORETICAL PROBABILITY MODELS**

In bottle production, bubbles that appear in the glass are considered defects. Any bottle that has more than two bubbles is classified as "nonconforming" and is sent to recycling. Suppose that the number of bubbles in a bottle is Poisson distributed with an average of 1.1 bubbles per bottle. Bubbles occur independently from one another. In answering the questions below use the probability tables in the back of the book.

A. What is the probability that a randomly chosen bottle is nonconforming?

B. Bottles are packed in cases of 12. An inspector chooses one bottle from each case. If it is nonconforming, she inspects the entire case, replacing nonconforming bottles with good ones. This process is called rectification. If the chosen bottle conforms (has two or fewer bubbles), then she passes the case. In total, 20 cases are produced. What is the probability that at least 18 of them pass?

C. What is the expected number of nonconforming bottles in the 20 cases after they have been inspected and rectified using the scheme described in part B.