# Appendix B

## Statement of the Total Probability Theorem

Given a set of mutually exclusive and collectively exhaustive *events*, $B_1$, $B_2$ , …, Bn, the probability P[A] of another event A can always be expanded in terms of the following joint probabilities (see Benjamin and Cornell 1970):

$$P[A] = P[B_1 \cap A] + P[B_2 \cap A] + \ldots + P[B_n \cap A] = \sum_{i}^{n} P[B_i \cap A] \qquad \text{(B - I)}$$