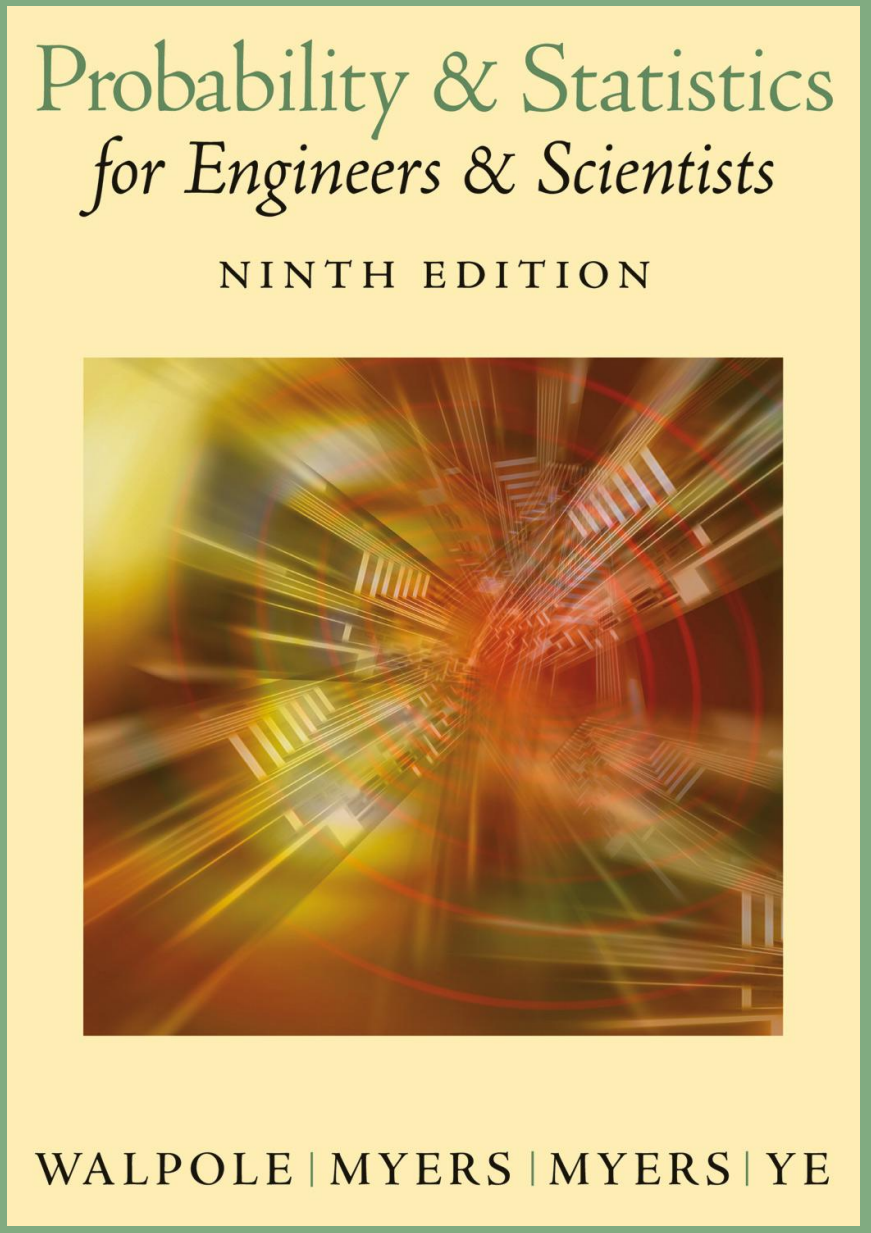
Chapter 5

Some Discrete Probability Distributions



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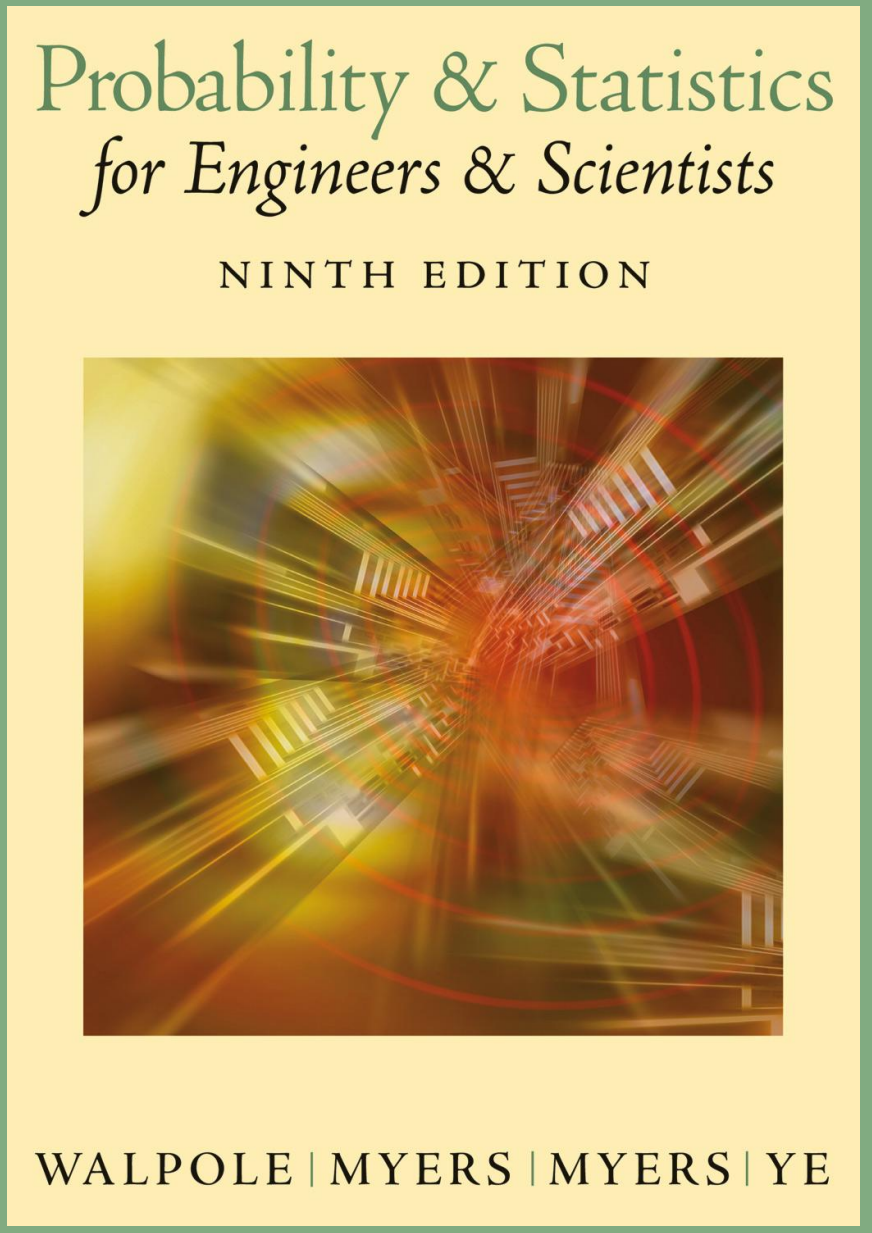
Section 5.1

Introduction and Motivation



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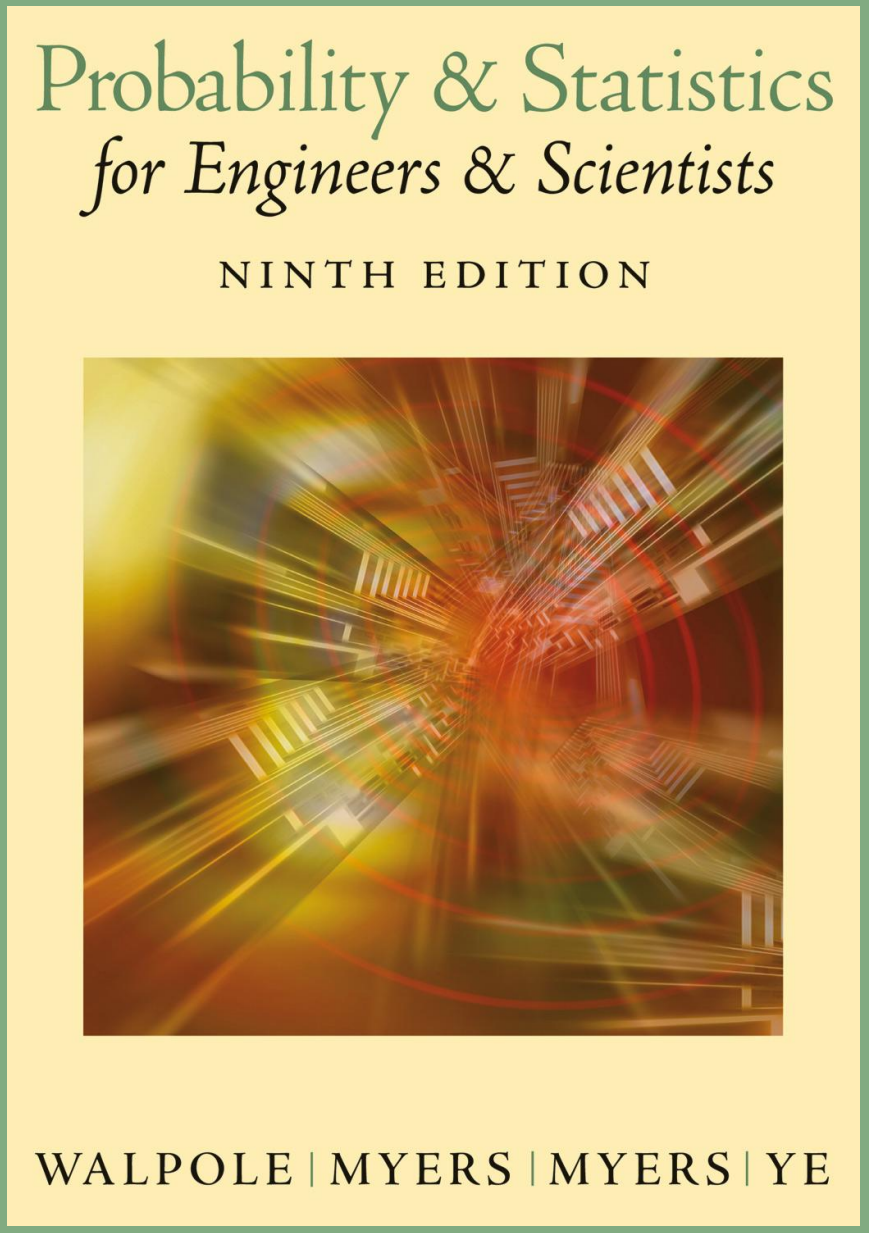
Section 5.2

Binomial and Multinomial Distributions



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Theorem 5.1

The mean and variance of the binomial distribution $b(x; n, p)$ are

$$\mu = np \text{ and } \sigma^2 = npq.$$

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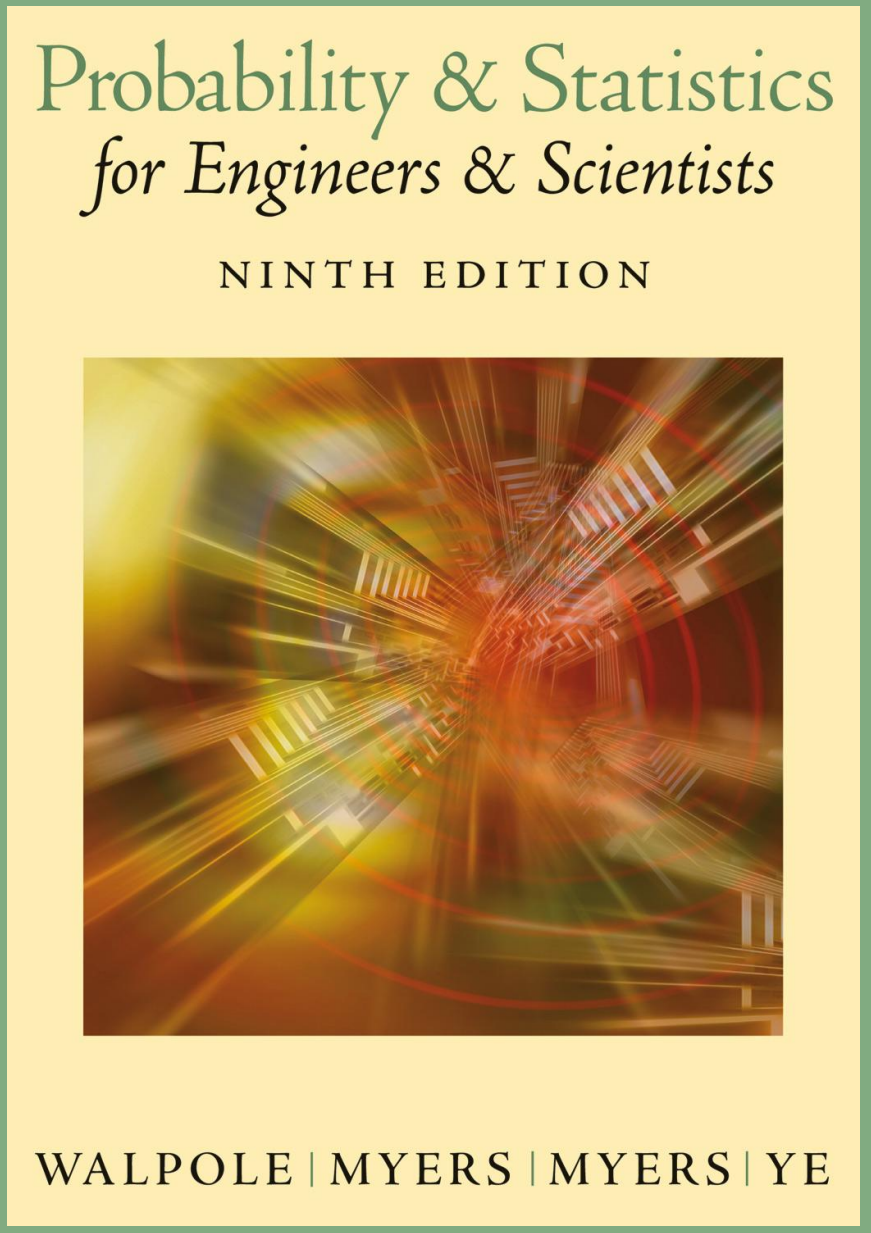
Section 5.3

Hypergeometric Distribution



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Theorem 5.2

The mean and variance of the hypergeometric distribution $h(x; N, n, k)$ are

$$\mu = \frac{nk}{N} \text{ and } \sigma^2 = \frac{N-n}{N-1} \cdot n \cdot \frac{k}{N}\left(1 - \frac{k}{N}\right).$$

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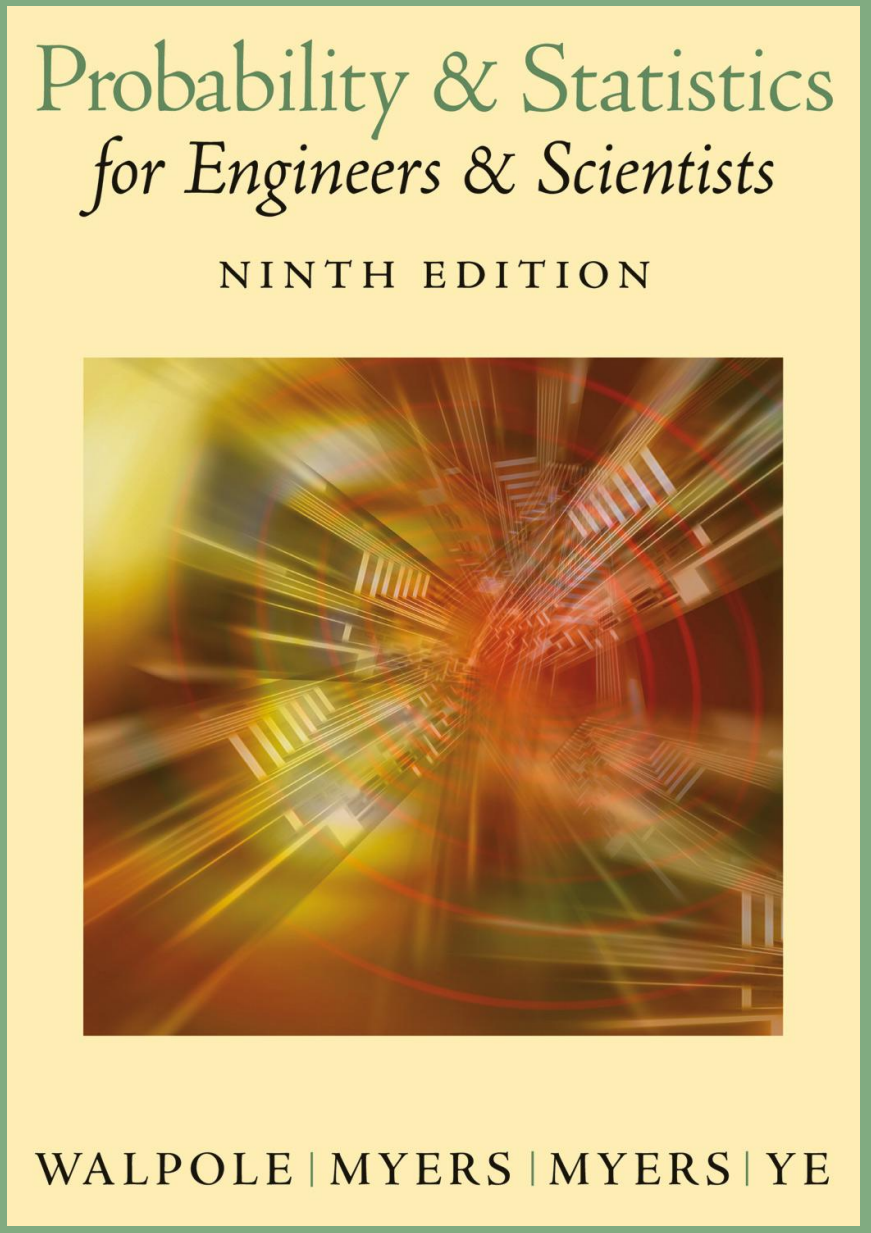
Section 5.4

Negative Binomial and Geometric Distributions



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Theorem 5.3

The mean and variance of a random variable following the geometric distribution are

$$\mu = \frac{1}{p} \text{ and } \sigma^2 = \frac{1-p}{p^2}.$$

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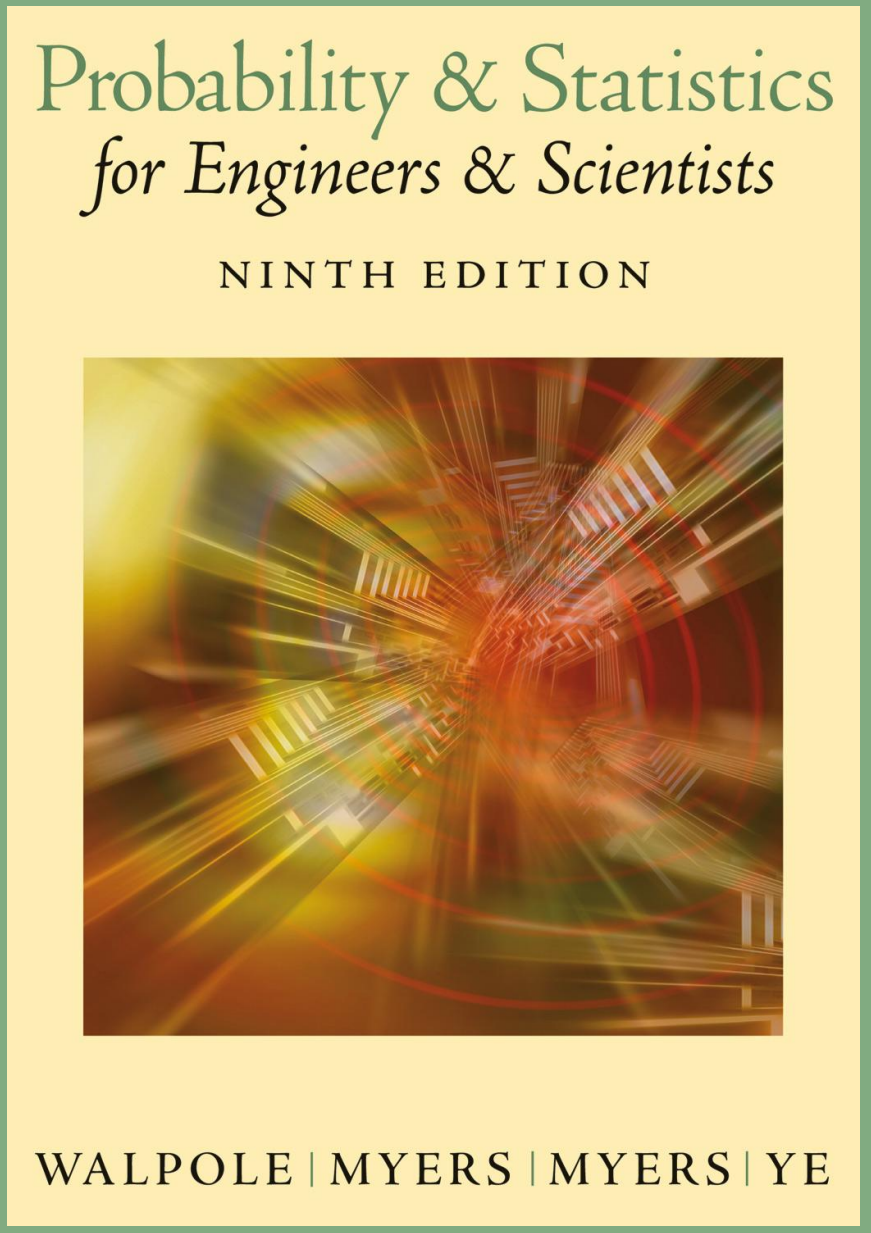
Section 5.5

Poisson Distribution and the Poisson Process



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Theorem 5.4

Both the mean and the variance of the Poisson distribution $p(x; \lambda t)$ are λt.

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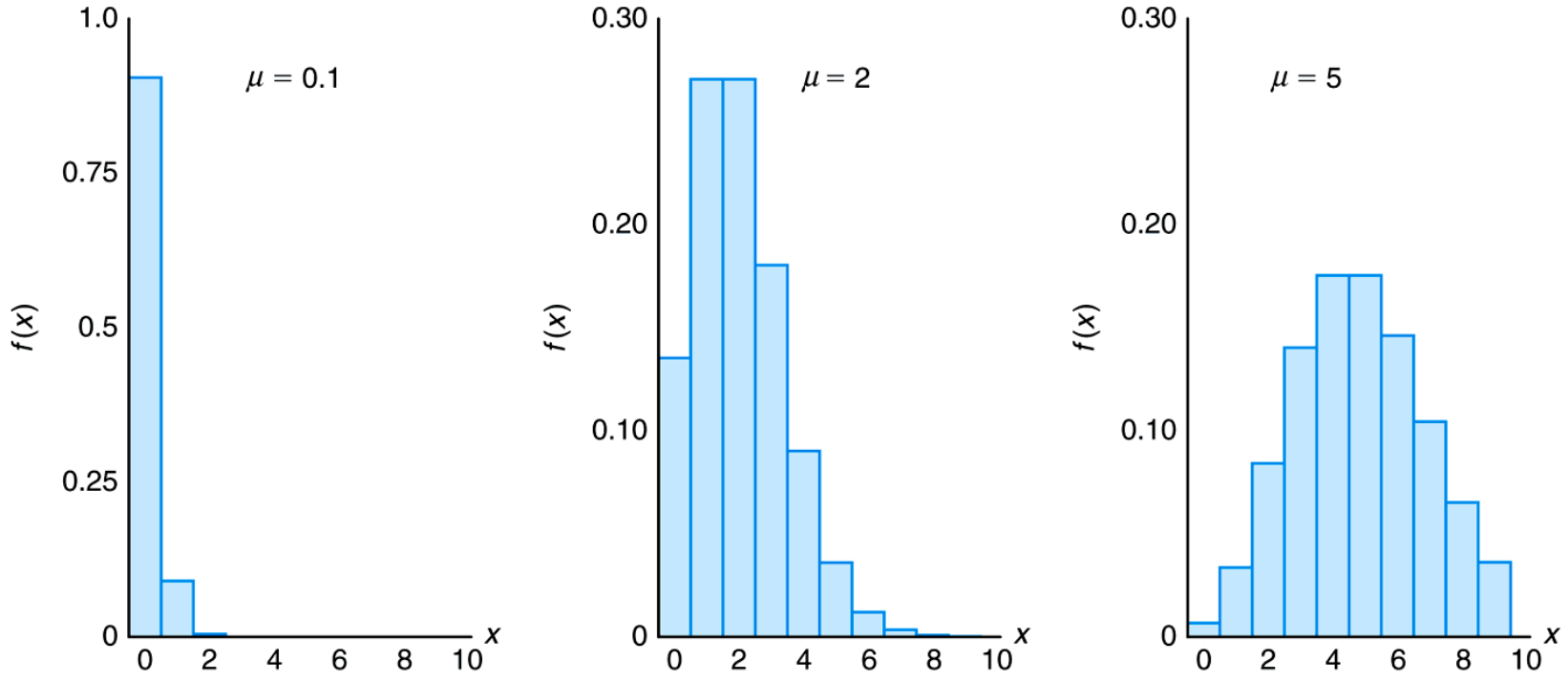
Figure 5.1 Poisson density functions for different means



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Theorem 5.5

Let X be a binomial random variable with probability distribution $b(x; n, p)$. When $n \to \infty$, $p \to 0$, and $np \overset{n\to\infty}{\longrightarrow} \mu$ remains constant,

$$b(x; n, p) \overset{n\to\infty}{\longrightarrow} p(x; \mu).$$

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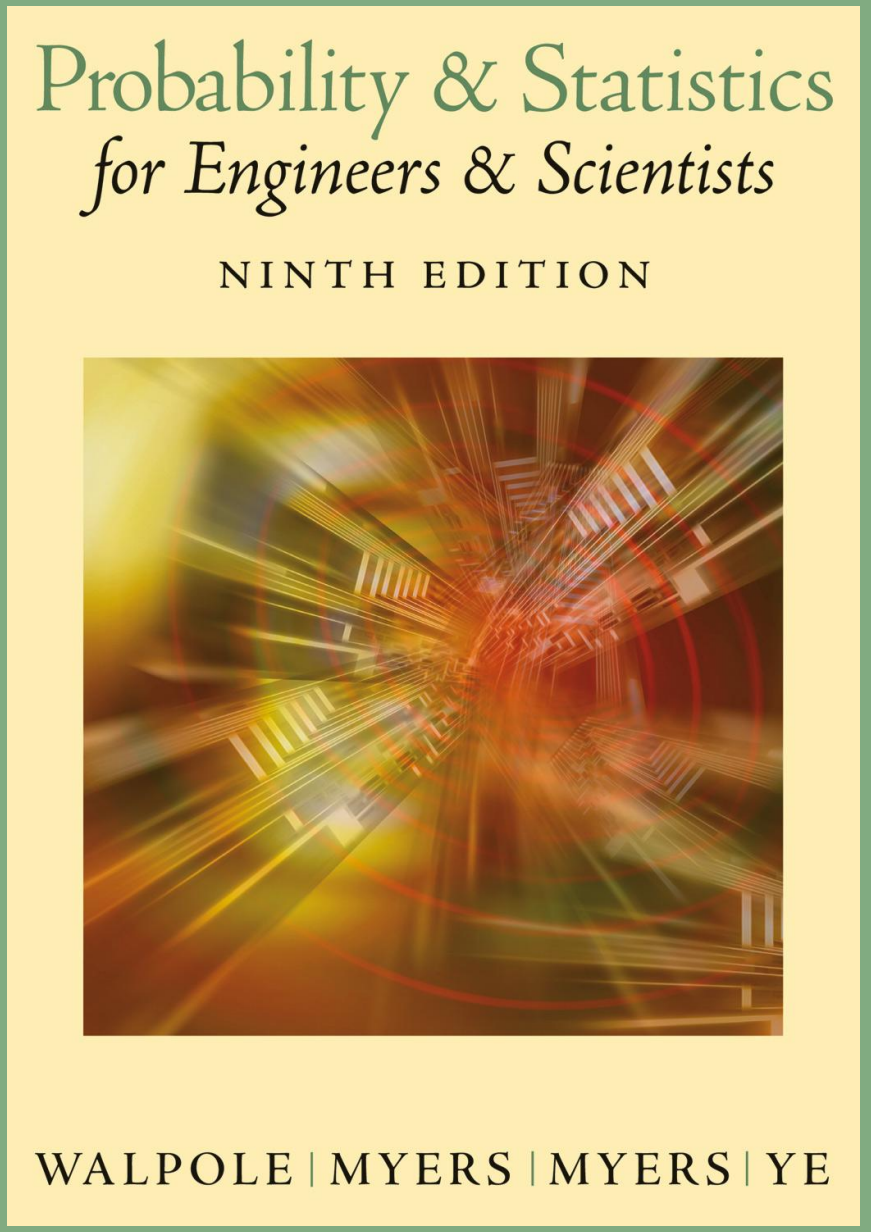
Section 5.5

Potential Misconceptions and Hazards; Relationship to Material in Other Chapters



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