Mean, variance, standard deviation and expectation

Section 5-3

Objectives

- Find the mean, variance, standard deviation, and expected value for a discrete random variable

Introduction

- Once we know that a probability distribution exist, we can describe it using various descriptive statistics
  - Visually using a graph, table, or formula
  - Algebraically, we can find the mean, variance, and standard deviation

Mean of a general discrete probability distribution

μ= population mean since ALL possible values are considered

$$\mu = \Sigma\left(x \bullet p(x)\right) = x_1 \cdot p(x_1) + x_2 \cdot p(x_2) + \ldots x_n \cdot p(x_n)$$

Mean is also known as "Expected Value"

Mean should be rounded to one more decimal place than the outcome x. Always simplify fractions

Variance & standard deviation

Variance

$$\sigma^2 = \sum (x^2 \cdot p(x)) - \mu^2$$

Standard Deviation

$$\sigma = \sqrt{\left[\sum (x^2 \cdot p(x)) - \mu^2\right]}$$

Example: Find the mean & standard deviation

x	1	2	3	4	5
P(x)	0.3	0.1	0.1	0.2	0.3

- In a study of brand recognition of Sony, groups of four consumers are interviewed. If x is the number of people in the group who recognize the Sony brand name, then x can be 0, 1, 2, 3, or 4 and the corresponding probabilities are 0.0016,0.0564, 0.1432, 0.3892, and 0.4096