

Properties of Expectation

1. **Affine Transformations.** Let X be a random variable with expectation $\mu_X = 2$. What is the expectation of $5X + 2$?

2. **Sums of Independent Random Variables.** Let X and Y be random variables with $\mu_X = 1$, $\mu_Y = -5$. What is $E(X + Y)$?

3. Let X and Y be random variables with $\mu_X = -2$, $\mu_Y = 3$.
 - (a) Find the expectation of $-3X + 2$.

 - (b) Find the expectation of $X + Y$.

4. You invite four people to go out to dinner on Friday night. The attendance probabilities for the four potential guests are 50%, 20%, 30%, and 90%.
 - (a) Find the expected number of guests.

 - (b) The dinner will be a *prix fixe* meal, costing \$50 per person. What is the expected total cost for yourself and your guests?

 - (c) What is the interpretation of your answer to part (b)?

Binomial Random Variables

5. A certain coin has a 25% of landing heads, and a 75% chance of landing tails.
- (a) If you flip the coin 4 times, what is the chance of getting exactly 2 heads?

(b) If you flip the coin 10 times, what is the chance of getting exactly 2 heads?

6. Suppose that you are rolling a die eight times. Find the probability that the face with two spots comes up exactly twice.

7. The probability is 0.04 that a person reached on a “cold call” by a telemarketer will make a purchase. If the telemarketer calls 40 people, what is the probability that at least one sale with result?

8. A new restaurant opening in Greenwich village has a 30% chance of survival during their first year. If 16 restaurants open this year, find the probability that

(a) exactly 3 restaurants survive.

(b) fewer than 3 restaurants survive.

(c) more than 3 restaurants survive.

9. The probability of winning at a certain game is 0.10. If you play the game 10 times, what is the probability that you win at most once?

10. The probability is 0.2 that an audit of a retail business will turn up irregularities in the collection of state sales tax. If 20 retail businesses are audited, find the probability that

(a) fewer than 2 will have irregularities in the collection of state sales tax.

(b) more than 2 will have irregularities in the collection of state sales tax.