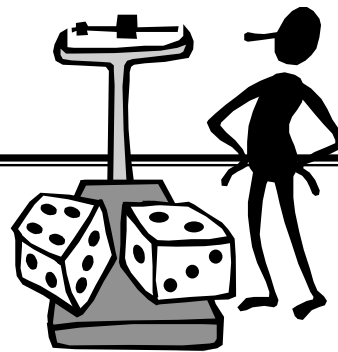# Chapter 16: Random Variables

Key Vocabulary:

- random variable
- discrete random variable
- continuous random variable
- standard deviation
- expected value
- E(X)
- V(X)

Calculator Skills:

- 1-VarStats L$_1$, L$_2$

1. What is meant by a random variable?

2. Explain the difference between a discrete random variable and a continuous random variable.

3. What information does a probability model give?

4. What is the expected value of a random variable?

5. How do you calculate the expected value of a random variable?

6. Explain the difference between the notations $\overline{x}$ and μ_X.

7. Suppose $\mu_X = 5$ and $\mu_Y = 10$. According to the rules for means, what is μ_{X+Y}?

8. Suppose $\mu_X = 2$. According to the rules for means, what is μ_{3+4X}?

9. Explain how to calculate the variance of a discrete random variable X using the formula
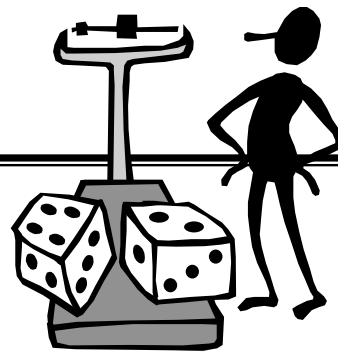 $$\sigma_X^2 = \sum (x_i - \mu_X)^2 p_i.$$

10. Given the variance of a random variable, explain how to calculate the standard deviation.

11. Suppose $\sigma_X^2 = 2$ and $\sigma_Y^2 = 3$ and X and Y are independent random variables. According to the rules for variances, what is σ_{X+Y}^2? What is σ_{X+Y}?

12. Suppose $\sigma_X^2 = 4$. According to the rules for variances, what is σ_{3+2X}^2? What is σ_{3+2X}?
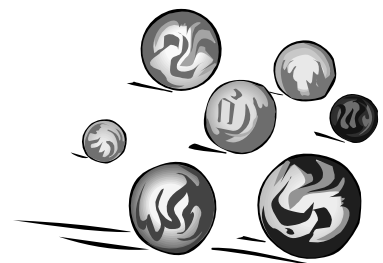
Chapter 17: Probability Models

Key Vocabulary:

- Bernoulli trials
- Geometric model
- Binomial model

Calculator Skills:	• geometpdf(	• binompdf(
	• geometcdf(	• binomcdf(

---

1. List three characteristics of Bernoulli trials.

2. What is the variable of interest in a *geometric model*?

3. How do you find the *expected value* and *standard deviation* of a *geometric random variable*?

4. In the *geometic distribution*, what does the parameter *p* represent?

5. If *X* has a *geometric distribution*, what does $(1 - p)^{n-1}p$ represent?

6. What is the difference between a *probability distribution function* (pdf) and a *cumulative distribution function* (cdf)?

7. What is the variable of interest in a *binomial model*?

8. Explain the difference between the *binomial setting* and the *geometric setting*.

9. How do you find the *expected value* and *standard deviation* of a *binomial random variable*?

10. In the *binomial distribution*, what do parameters *n* and *p* represent?

11. What is meant by *B(n, p)* ?

12. In the formula $\binom{n}{k} = \dfrac{n!}{k!(n-k)!}$, what does *n* represent? What does *k* represent?

    What does the value of $\binom{n}{k} = \dfrac{n!}{k!(n-k)!}$ represent?

13. Complete the following table of values:

1!	1	1
2!	2 x 1	2
3!	3 x 2 x 1	6
4!	4 x 3 x 2 x 1	24

5!	5 x 4 x 3 x 2 x 1	
6!		
7!		
n!		

14. What is the value of $\dfrac{n!}{(n-1)!}$?