Exercise Set IV.1

1. (4.2) The probability distribution of the discrete random variable X is

$$f(x) = \binom{3}{x}\left(\frac{1}{3}\right)^{x}\left(\frac{3}{4}\right)^{3-x}, \text{ for } x = 0, 1, 2, 3,$$

   Find the mean of X.

2. (4.10) Two tire-quality experts examine stacks of tires and assign quality ratings to each tire on a 3-point scale.
   - Let X denote the grade given by expert A
   - and Y denote the grade given by B.

   The following table gives the joint distribution for X and Y.

			y	
	$f(x,y)$	1	2	3
	1	0.10	0.05	0.02
x	2	0.10	0.35	0.05
	3	0.03	0.10	0.20

   Find μ_X and μ_Y.

Exercise Set IV.2

3 (4.23) Suppose that X and Y have the following joint probability function:

		x	
	$f(x,y)$	2	4
	1	0.10	0.15
y	3	0.20	0.30
	5	0.10	0.15

(a) Find the expected value of $g(X,Y) = XY^2$.
(b) Find μ_X and μ_Y.

4 (4.35) The random variable X, representing the number of errors per 100 lines of software code, has the following probability distribution:

x	2	3	4	5	6
$f(x)$	0.01	0.25	0.4	0.3	0.04

Using Theorem 4.2, find the variance of X.

5 (4.40) Referring to Exercise 4.14 on page 113, find $\sigma^2_{g(X)}$ for the function $g(X) = 3X^2 + 4$.

Exercise Set IV.3

6 (4.55) Let X be a random variable with the following probability distribution:

x	-3	6	9
$f(x)$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

Find $E(X)$ and $E(X^2)$ and then, using these values evaluate $E[(2X+1)^2]$.

7 (4.60) Seventy new jobs are opening up at an automobile manufacturing plant, but 1000 applicants show up for the 70 positions.

i. To select the best 70 from among the applicants, the company gives a test that covers mechanical skill, manual dexterity, and mathematical ability.

ii. The mean grade on this test turns out to be 60, and the scores have a standard deviation 6.

Assume that the distribution is symmetric about the mean. Can a person who has an 84 score count on getting one of the jobs? [Hint: Use Chebyshev's theorem.]

Exercise Set IV.4

8 (4.61) An electrical firm manufactures a 100-watt light bulb, which, according to specifications written on the package, has a mean life of 900 hours with a standard deviation of 50 hours. At most, what percentage of of the bulbs fail to last even 700 hours? Assume that the distribution is symmetric about the mean.