

Sections #3 and #4

- (1) Let X be a discrete random variable with probability mass function $f(x) = k(x+2k)$; for $x = 0, 1, 2, 3, 4, 5$. Find $P(1 < X < 4)$.
- (2) The length of time required by students to complete a 1-hour exam is a random variable with a probability density function given by

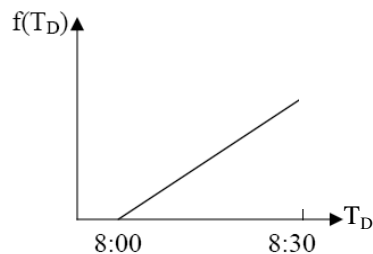
$$f(y) = \begin{cases} cy^2 + y, & \text{for } 0 \leq y \leq 1 \\ 0, & \text{elsewhere} \end{cases}$$

- (a) Find c .
- (b) Find $F(y)$ and compute $F(-1)$, $F(0)$, and $F(1)$.
- (c) Find the probability that a student finishes in less than a half hour.
- (d) Find the probability that a student finishes in more than 45 minutes.
- (3) The number of line painting errors per km of a new highway is given by

| X | 0 | 1 | 2 | 3 | 4 | 5 |
|--------|------|------|------|------|------|------|
| $f(x)$ | 0.30 | 0.38 | 0.16 | 0.11 | 0.03 | 0.02 |

What is the probability that X is at least 1 and less than 5?

- (4) The shelf life, in days, of bottles of a certain prescription medicine is a random variable having the density function $f(x) = 20,000/(x+100)^3$ for $x > 0$ and 0 elsewhere. Find the probability that a bottle of medicine will have a shelf life of
- a. at least 200 days
- b. anywhere from 80 to 120 days.
- (5) A person leaves for work between 8:00 am and 8:30 am. The probability density function of his departure time T_D can be represented as shown in the figure below:



Regardless of the time the person leaves for work, it takes that person between 30 and 40 minutes to get to work (T_W), any length of time being equally likely. What is the expected time this person will be at work?

- (a) 8:55 am
- (b) 8:45 am
- (c) 9:15 am
- (d) 8:50 am
- (e) none of the above

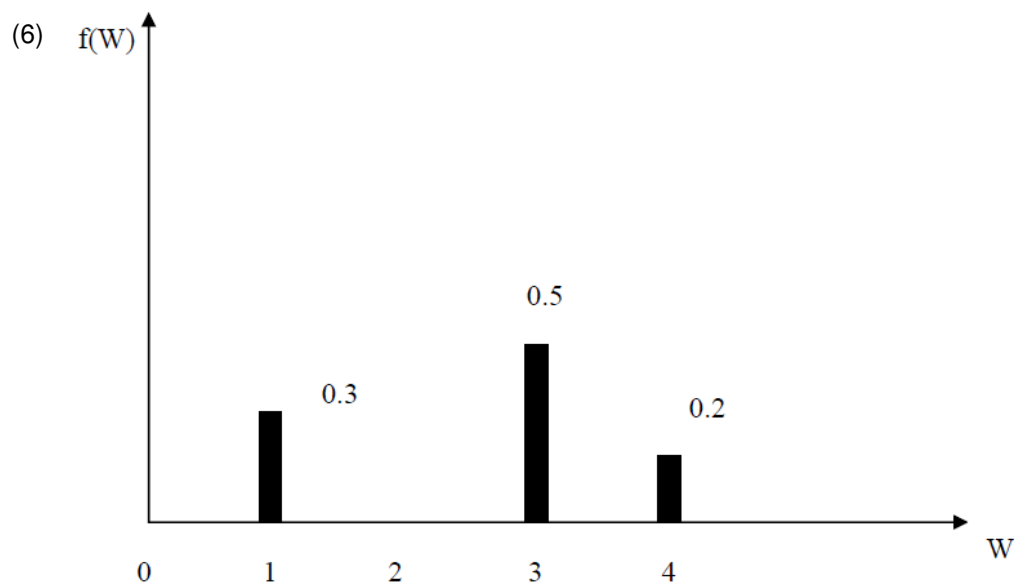


Figure 1

The discrete random variable W has the probability mass function shown in Figure 1. What is the variance of W ?

- a. 5.40
 - b. 1.24
 - c. 1.10
 - d. 8.00
 - e. None of the above
- (7) Given a discrete random variable X that has the following probabilities associated with its outcomes:

| | |
|------|-----------|
| k | $x = 0$ |
| $2k$ | $x = 1$ |
| $3k$ | $x = 2$ |
| 0 | Otherwise |

find the variance of X

- a. $7/9$
- b. $2/9$
- c. $7/3$
- d. $5/3$
- e. None of the above