There are 7 problems, each carries 5 points. Total 35.

1)

13. A mail-order computer business has six telephone lines. Let X denote the number of lines in use at a specified time. Suppose the pmf of X is as given in the accompanying table.

x	0	1	2	3	4	5	6
$p(x)$	.10	.15	.20	.25	.20	.06	.04

Calculate the probability of each of the following events.

a. {at most three lines are in use} .7

b. {fewer than three lines are in use} .45

c. {at least three lines are in use} .55

d. {between two and five lines, inclusive, are in use} .71

2)

24. An insurance company offers its policyholders a number of different premium payment options. For a randomly selected policyholder, let X = the number of months between successive payments. The cdf of X is as follows:

$$F(x) = \begin{cases} 0 & x < 1 \\ .30 & 1 \le x < 3 \\ .40 & 3 \le x < 4 \\ .45 & 4 \le x < 6 \\ .60 & 6 \le x < 12 \\ 1 & 12 \le x \end{cases}$$

a. What is the pmf of X?

b. Using just the cdf, compute $P(3 \le X \le 6)$ and $P(4 \le X)$.

Pmf =

3)

a)

1	3	4	6	12
.30	.10	.15	.15	.40

5) .4

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29. The pmf of the amount of memory X (GB) in a purchased flash drive was given in Example 3.13 as

x	1	2	4	8	16
$p(x)$	.05	.10	.35	.40	.10

Compute the following:
a. $E(X)$ 6.45
b. $V(X)$ directly from the definition 15.6475
c. The standard deviation of X 3.95557
d. $V(X)$ using the shortcut formula 15.6475

4)

30. An individual who has automobile insurance from a certain company is randomly selected. Let Y be the number of moving violations for which the individual was cited during the last 3 years. The pmf of Y is

y	0	1	2	3
$p(y)$	.60	.25	.10	.05

a. Compute $E(Y)$. .6
b. Suppose an individual with Y violations incurs a surcharge of $\$100Y^2$. Calculate the expected amount of the surcharge. \$121

$110\{(1^2 \cdot .25)+(4 \cdot .1)+(9 \cdot .05)\}$

5)

32. An appliance dealer sells three different models of upright freezers having 13.5, 15.9, and 19.1 cubic feet of storage space, respectively. Let X = the amount of storage space purchased by the next customer to buy a freezer. Suppose that X has pmf

x	13.5	15.9	19.1
$p(x)$	.2	.5	.3

...mpute $E(X)$, $E(X^2)$, and $V(X)$.

... price of a freezer having capacity X cubic feet is $25X - 8.5$, what is the expected price paid by the next customer to buy a freezer?

c. What is the variance of the price $25X - 8.5$ paid by the next customer?

d. Suppose that although the rated capacity of a freezer is X, the actual capacity is $h(X) = X - .01X^2$. What is the expected actual capacity of the freezer purchased by the next customer?

a) $E(X) = 16.38$
$E(x^2) = 272.3$
$V(X) = 3.844$

b) $\$401$

c) 2495.624

d) $16.38 - .01 \cdot 272.3 = 13.66$

6)

35. Let X be a Bernoulli rv with pmf as in Example 3.18.
a. Compute $E(X^2)$. $= p$
b. Show that $V(X) = p(1 - p)$.

$p(1-p)$ $(p - p^2)$ which is
$V(x) = (x - x^2)$

7)

37. The n candidates for a job have been ranked 1, 2, 3, . . . , n. Let X = the rank of a randomly selected candidate, so that X has pmf

$$p(x) = \begin{cases} 1/n & x = 1, 2, 3, \ldots, n \\ 0 & \text{otherwise} \end{cases}$$

(this is called the *discrete uniform distribution*). Compute $E(X)$ and $V(X)$ using the shortcut formula. [*Hint:* The sum of the first n positive integers is $n(n + 1)/2$, whereas the sum of the n squares is $n(n + 1)(2n + 1)/6$.]

$E(x) = (n+1)/2$

$E(x^2) = (n+1)(n+2)/6$