Solution of Assignment 2

1.

(a) The expected value is the sum of the product of each possibility with its probability

E(X) = = 13.2 x 0.3 + 15.9 x 0.45 + 19.1 x 0.25 = 15.89

E(X2) = = 257.239

Property variance:

V(X) = E(X2)-

Using this property, we then obtain that the variance is:

V(X) = E(X2)- = 257.239 - = 4.7469

(b) For the linear combination X+, the expected value and variance are as follows (properties):

E() =E(X)+

V() = V(X)

Using the property of the mean with =25 and =-8.5, we then obtain:

E(25X–8.5) = 25E(X)-8.5 = 25(15.89)-8.5 = 388.75

(c) Using the property of the variance with =25 and =-8.5, we then obtain:

V(25X-8.5) = V(X) = (4.7469) = 2966.8125

(d) For the linear combination , the expected value is as follows

E() =E()+E()

Using this property with and , we then obtain:

E(X-0.01X2) = E(X)-0.01E(X2) = 15.89 – 0.01(257.239) = 13.31761

2.

a)

b)

Let X be the number of passengers who appears and Y be the number of available places when the limousine departs.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Y | 4 | 3 | 2 | 1 | 0 | 0 | 0 |

c)

|  |  |
| --- | --- |
| Number of observations | 3 4 5 6 |
| Probability | 0.1 0.2 0.3 0.4 |

Let N be the number of reservations.

3.

a)

b) Since n is large and p is small, it can be approximated by the Poisson distribution with

c)

4.

a)

b) Let X be the number of small aircraft that arrive during a 90-min period.

c) Let X be the number of small aircraft that arrive during a 2.5-hr period.

5.

a)

b)

c)

d)

e)

f)

g)

h)

0.0609

6.

a)

b) F(x) = (x>1)

c) P(X>2) = 1- F(2) = 1-

P(2<X<3) = F(3) – F(2)

F(3) = , F(2) =

F(3) – F(2) =

d)

E(x) = (mean value of headway)

E(x2) =

V(x) = E(x2) –

Sd(x) =

e) P(1.5−0.866<X<1.5+0.866) = =P(0.634<X<2.366) = F(2.366)−F(0.634)

F(2.366)−F(0.634) = F(2.366) – 0