

Student Information

Full Name : Nazır Bilal Yavuz

Id Number : 2099471

CENG222 Assignment 2

Answer 1

Probability of more accidents on Friday and probability of more accidents on Thursday are same and we must count if accidents' count are same. We can calculate same accident's probability, subtract it from 1 and we must divide it by 2.

Calculate same probability:

For 0 : $0.6 * 0.6 = 0.36$ For 1 : $0.2 * 0.2 = 0.04$ For 2 : $0.2 * 0.2 = 0.04$

$0.36 + 0.04 + 0.04 = 0.44$

Subtract from 1: $1 - 0.44 = 0.56$

Divide by 2: $0.56/2 = 0.28$

Answer 2

For a)

For at least one hardware failure we can subtract $P(0,0)$ from 1.

$1 - 0.52 = 0.48$

For b)

We know that $P(0,0) = 0.52$ and we can calculate that:

$P(X = 0) = 1 - (0.20 + 0.02 + 0.01 + 0.04 + 0.01) = 1 - 0.28 = 0.72$

$P(Y = 0) = 1 - (0.14 + 0.02 + 0.01 + 0.06 + 0.01) = 1 - 0.24 = 0.76$

We must check that: $P(0,0) == P(X = 0) * P(Y = 0)$

$0.52 \neq 0.72 * 0.76$

So they are not independent.

Answer 3

Expectations:

$E(X) = -2 * 0.5 + 2 * 0.5 = 0$

$E(Y) = -1 * 0.8 + 4 * 0.2 = 0$

Variances:

$Var(X) = -2 * -2 * 0.5 + 2 * 2 * 0.5 - 0 = 4$

$Var(Y) = -1 * -1 * 0.8 + 4 * 4 * 0.2 - 0 = 4$

Calculate a,b and c part:

For a)

$$E(100 * X) = 100 * E(X) = 0$$

$$Var(100 * X) = 100 * 100 * Var(X) = 40000$$

For b)

$$E(100 * Y) = 100 * E(Y) = 0$$

$$Var(100 * Y) = 100 * 100 * Var(Y) = 40000$$

For c)

$$E(50 * X + 50 * Y) = 50 * E(X) + 50 * E(Y) = 0$$

$$Var(50 * X + 50 * Y) = 50 * 50 * Var(X) + 50 * 50 * Var(Y) = 2500 * 4 + 2500 * 4 = 20000$$

Answer 4

For a)

For at least 5 file, we can find 0,1,2,3,4 files are damaged and we can subtract it from 1.

$$\text{For } 0 = 0.8^{20}$$

$$\text{For } 1 = 0.2 * \binom{20}{1} * 0.8^{19}$$

$$\text{For } 2 = 0.2^2 * \binom{20}{2} * 0.8^{18}$$

$$\text{For } 3 = 0.2^3 * \binom{20}{3} * 0.8^{17}$$

$$\text{For } 4 = 0.2^4 * \binom{20}{4} * 0.8^{16}$$

We must add them and we must subtract them from 1. Referring the "Table A2. Binomial distribution pg(412)" from book result must be $1 - 0.63 = 0.37$.

For b)

In the first 5 file there can be 0,1 and 2 undamaged files.

$$\text{For } 0 = 0.2^5$$

$$\text{For } 1 = 0.2^4 * \binom{5}{1} * 0.8^1$$

$$\text{For } 2 = 0.2^3 * \binom{5}{2} * 0.8^2$$

After adding them result = 0.058