Problema #1

$S = \{-2, -1, 1\}$

$P_1 = \frac{4 \times 3}{4 \times 5} = \frac{3}{5}$

$P_{BS} = \frac{1}{5}$

$P_J = \frac{1}{5}$

$E[X] = -2 \times \frac{1}{5} + (-1) \times \frac{1}{5} + 1 \times \frac{3}{5} = \frac{-2-1+3}{5} = 0 //$

Problema #5

1.

b → Valor esperado

c → Varianza

$b = E[X] = 1 \times \frac{1}{2} + 2 \times \frac{1}{4} + 3 \times \frac{1}{8} + 4 \times \frac{1}{8}$

$= \frac{1}{2} + \frac{1}{2} + \frac{3}{8} + \frac{1}{2} = \frac{15}{8}$

$E[X^2] = 1^2 \times \frac{1}{2} + 2^2 \times \frac{1}{4} + 3^2 \times \frac{1}{8} + 4^2 \times \frac{1}{8}$

$= \frac{1}{2} + 1 + \frac{9}{8} + 2 = \frac{37}{8}$

$Var[X] = \frac{37}{8} - \left(\frac{15}{8}\right)^2 = \frac{71}{64}$

$c = \sigma = \sqrt{\frac{71}{64}} = \frac{\sqrt{71}}{8}$

Problème #6

$x \in \{0, 1\}$

$y \in \{0, 1\}$

a)

$P(x=0) = \frac{1}{9} + \frac{2}{9} = \frac{1}{3}$

$P(x=1) = \frac{2}{9} + \frac{4}{9} = \frac{2}{3}$

$P(y=0) = \frac{1}{9} + \frac{2}{9} = \frac{1}{3}$

$P(y=1) = \frac{2}{9} + \frac{4}{9} = \frac{2}{3}$

b)

$E[x] = 0 \times \frac{1}{3} + 1 \times \frac{2}{3} = \frac{2}{3}$

$E[x^2] = 0^2 \times \frac{1}{3} + 1^2 \times \frac{2}{3} = \frac{2}{3}$

$Var(x) = E[x^2] - (E[x])^2 = \frac{2}{3} - \left(\frac{2}{3}\right)^2 = \frac{2}{9}$

c)

$Cov(x, y) = E[xy]$

$= 0 \times 0 \times \frac{1}{9} + 0 \times 1 \times \frac{2}{9} + 1 \times 0 \times \frac{2}{9} + 1 \times 1 \times \frac{4}{9}$

$= \frac{4}{9}$

d)

$Cov(x, y) = \frac{4}{9} - \frac{2}{3} \times \frac{2}{3} = 0$ //

$P(x=0, y=0) = \frac{1}{9}$

$P(x=0) \times P(y=0) = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

$P(x=0, y=1) = \frac{2}{9}$

$P(x=0) \times P(y=1) = \frac{2}{9}$

$P(x=1, y=0) = \frac{2}{9}$

$P(x=1) \times P(y=0) = \frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$

São Independentes

problema # 7

1600 pacotes de 100 bits

a) Binomial

b) $E[X] = n \times p = 1600 \times 0,01 = 16$

c) $P(X=20) = \binom{1600}{20} 0,01^{20} (1 - 0,01)^{1600-20}$

d)

$$P(X=20) = \frac{16^{20}}{20!} e^{-16}$$

e) Não sai

Problema # 8

$P(r|F_v) = 0,8$

$P(r|F_{nr}) = 0,1$

$P(F_r) = 0,7$ fall / winter

$P(F_r) = 0,2$ summer / spring

$P(r) = 0,7 \times 0,8 + 0,3 \times 0,1$ W / F

$P(r) = 0,2 \times 0,8 + 0,8 \times 0,1$ S / Sp

a)

$$P(F_v \mid v) = \frac{P(v \mid F_v) \times P(F_v)}{P(v)}$$

w/ F

$$= \frac{0,8 \times 0,7}{0,7 \times 0,8 + 0,3 \times 0,1} = \frac{56}{59}$$

$$P(F_v \mid v) = \frac{0,8 \times 0,2}{0,2 \times 0,8 + 0,8 \times 0,1} =$$

S/ Sp

$$= \frac{16}{24} = \frac{2}{3}$$