Assignment 8 of CISC 1006

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1.1

$$P(X=x,Y=y)=\frac{C_3^x C_2^y 6 C_3^{4-x-y}}{C_8^{x+y}}$$

$0\le x\le 3, 0\le y\le 2, 0\le x+y\le 4$ **and** $0\le 4-x-y\le 4 \to 0\le x+y\le 4, x+y\ge 1$**, i.e.**

$$\begin{aligned} 0\le x\le 3,\\ 0\le y\le 2,\\ 1\le x+y\le 4 \end{aligned}$$

1.2

$$\begin{aligned} P[(X,Y)\in A]=&P(0,1)+P(0,2)+\\ &P(1,0)+P(1,1)+\\ &P(2,0)\\ =&\frac{2+3+3+18+9}{70}\\ =&\frac{1}{2} \end{aligned}$$

1.3

Let $g(x)$ **and** $h(y)$ **be the marginal distribution functions of** X **and** Y**,**

	$x=0$	$x=1$	$x=2$	$x=3$	$h(y)$
$y=0$	null	$\frac{3}{70}$	$\frac{9}{70}$	$\frac{3}{70}$	$\frac{15}{70}$
$y=1$	$\frac{1}{35}$	$\frac{18}{70}$	$\frac{18}{70}$	$\frac{2}{70}$	$\frac{40}{70}$
$y=2$	$\frac{3}{70}$	$\frac{9}{70}$	$\frac{3}{9}$	null	$\frac{15}{70}$
$g(x)$	$\frac{5}{70}$	$\frac{30}{70}$	$\frac{30}{70}$	$\frac{5}{70}$	

1.4

From (1.3/c) we can get,

$$\begin{aligned} f(0|X=2) &= \frac{9}{70}/\frac{30}{70} \\ &= 0.3 \\ f(1|X=2) &= \frac{18}{70}/\frac{30}{70} \\ &= \frac{9}{35}/\frac{30}{70} \\ &= 0.6 \\ f(2|X=2) &= \frac{3}{70}/\frac{30}{70} \\ &= 0.1 \end{aligned}$$

1.5

From (1.4/d) we can know that $P(Y=0|X=2)=0.3$

1.6

$$\begin{aligned} cov(X,Y) &= \sum P(x,y)(x-E[x])(y-E[y]) \\ &= \end{aligned}$$