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Thứ
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Problem 1:

a, $8! = 40320$

b, $4! . (2!)^4 = 4! . 2^4 = 384$.

Problem 4:

a, $E(X) = \mu = \sum_x x.f(x)$

$= (-3) . \frac{1}{6} + 6 . \frac{1}{2} + 9 . \frac{1}{3}$

$= 5,5$

b, $E(aX + b) = aE(X) + b$

$\Rightarrow \mu_{g(x)} = \mu_{(2x+3)} = 2E(X) + 3$

$= 2 . 5,5 + 3$

$= 14$.

c, $E(X^2) = \sum_x x^2 f(x)$

$= (-3)^2 . \frac{1}{6} + 6^2 . \frac{1}{2} + 9^2 . \frac{1}{3}$

$= 46,5$.

$\Rightarrow \sigma^2 = Var(X) = E(X^2) - [E(X)]^2$

$= 46,5 - 5,5^2$

$= 16,25$

Thứ
Ngày . . No.

$\sigma^2_{ax+c} = \sigma_x a^2 = a^2\sigma^2$

$\Rightarrow \sigma^2_{g(x)} = \sigma^2_{(2x+3)} = 2^2 . \sigma^2$
$= 4 . 16,25$
$= 65$

$\Rightarrow \sigma_{g(x)} = \sqrt{65}$

Problem 2:

a, 0,75 . 0,5 = 0,35 .

b, 0,35 / 0,4 = 0,875

c, P(both watch) = 0,35
P(man watches and woman does not) = 0,05 .
P(woman watches and man does not) = 0,15

There jore , P(at least 1 watches)
= 1 - 0,35 - 0,05 - 0,15
= 0,45 .

Problem 3:

a, $\int_{x=0}^{1}\int_{y=0}^{1} f(x,y)\,dx\,dy = \int_{x=0}^{1}\int_{y=0}^{1} c(x+2y)\,dx\,dy$

$= c\cdot\frac{3}{2} \Leftrightarrow c\cdot\frac{3}{2} = 1 \Rightarrow c = \frac{2}{3}.$

b, $P(X<\frac{2}{3}, Y>\frac{1}{2})$

$= \frac{2}{3}\cdot\int_{x=0}^{2/3}\int_{y=1/2}^{1} (x+2y)\,dx\,dy = \frac{17}{54}$

c, X given Y

+) $f_2(y) = \frac{2}{3}\int_0^1 (x+2y)\,dx = \frac{2}{3}\left(\frac{1}{2}+2y\right)$

+) $f(x/y) = \begin{cases} \dfrac{x+2y}{\frac{2}{3}\cdot\left(\frac{1}{2}+2y\right)} & ; \text{ for } 0\le x\le 1 \\ 0 & ; \text{ other wise} \end{cases}$

d, +) $f(x,y) = \frac{2}{3}(x+2y)$

+) $f_1(x) = \frac{2}{3}\cdot\int_0^1 (x+2y)\,dy = \frac{2}{3}(x+1)$

+) $f_2(y) = \frac{2}{3}\cdot\int_0^1 (x+2y)\,dx = \frac{2}{3}\left(\frac{1}{2}+2y\right)$

$\Rightarrow f(x,y) \neq f_1(x)\cdot f_2(y)$

So X & Y are dependent.