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$f(xy) = 4kxy \quad 0<x<3 \quad ve \quad 1<y<4$

1-) a-) $\int_0^3 \int_1^4 4kxy \, dy dx = 1 \Rightarrow 4k \int_0^3 \left(\frac{xy^2}{2} \Big|_1^4 \right) dx = 4k \int_0^3 \left(\frac{16x}{2} - \frac{x}{2} \right)$

$4k \left(\frac{15x^2}{2} \Big|_0^3 \right) = 4k \left(\frac{15 \cdot 9}{2} - 0 \right) = 1 \quad 270k = 1 \quad k = \frac{1}{270}$

b-) $f_x(x) = \int_1^4 \frac{4xy}{270} dy = \frac{4xy^2}{540} \Big|_1^4 = \frac{64x}{540} - \frac{4x}{540} = \frac{60x}{540} = \frac{x}{9}$

$f_y(y) = \int_0^3 \frac{4xy}{270} dx = \frac{4x^2y}{540} \Big|_0^3 = \frac{36y}{540} - 0 = \frac{y}{15}$

$f_x(x) \cdot f_y(y) = 0$ varsayımı

$f(x,y) = \frac{4xy}{270} = \frac{x}{9} \cdot \frac{y}{15} = \frac{xy}{135} \neq \frac{xy}{67,5}$ olduğundan bağımlıdır.

c-) $f(x) \Rightarrow \int_1^4 \int_0^x \frac{4sy}{270} ds dy = \frac{4}{270} \int_1^4 \frac{s^2 y}{2} \Big|_0^x dy = \frac{4}{270} \int_1^4 \frac{x^2 y}{2} dy$

$\frac{4}{270} \left(\frac{x^2 y^2}{4} \Big|_1^4 \right) = \frac{4}{270} \left(\frac{16x^2}{4} - \frac{x^2}{4} \right) = \frac{4 \cdot 15x^2}{270 \cdot 4} = \frac{x^2}{36}$

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1-) d-) $V(x) = E(x^2) - E(x)^2$

$$E(x) = \int_0^3 x\, f(x)\,dx = \int_0^3 x \cdot \frac{x}{9}\,dx = \frac{x^3}{27}\Big|_0^3 = 1$$

$$E(x^2) = \int_0^3 \frac{x^2 x}{9}\,dx = \frac{x^4}{36}\Big|_1^4 = \frac{81}{36}$$

$$V(x) = \frac{81}{36} - 1^2 = \frac{45}{36}$$

e-) $P(1<x<2 \mid 2<y<3)$

$$P(x/y) = \frac{f(x,y)}{f_y(y)} \qquad \frac{\frac{4xy}{270}}{\frac{y}{15}} = \frac{4xy^2}{18} \Rightarrow \frac{4xy^2}{18}\Big|_2^3 = \frac{36x}{36} - \frac{16x}{36} = \frac{20x}{36}$$

$$P(1<x<2 \mid 2<y<3) = \int_1^2 \frac{20x}{36}\,dx = \frac{20x^2}{36}\Big|_1^2 = \frac{400-20}{36}$$

$$= \frac{380}{36}$$

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2-) $P(x) = k3^x \quad x = 2,3,4$

a-) $\sum_{x=2}^{4} k3^x = 1 \Rightarrow k(3^2 + 3^3 + 3^4) = 1 \quad 117k = 1 \quad k = \frac{1}{117}$

b-) $E(e^{tx}) = M_x(t) = \sum_{x=2}^{4} \frac{e^{tx}3^x}{117} = \frac{e^{2t}3^2}{117} + \frac{e^{3t}3^3}{117} + \frac{e^{4t}3^4}{117}$

$= \frac{9e^{2t} + 27e^{3t} + 81e^{4t}}{117} = \frac{117}{117}(e^{2t} + e^{3t} + e^{4t})$

$E(e^{tx}) = e^{2t} + e^{3t} + e^{4t}$

3-) $p_1 = 0.17 \quad p_2 = 0,07$

$P\left(\sqrt{\frac{0,17(0,83)}{100}}\right) > 172 \quad P\left(\sqrt{\frac{0,07(0,93)}{100}}\right) < 157$

Ortalama $\hat{p}_1 = 6,46$

Ortalama $\hat{p}_2 = 4,00$

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4-) Dakikada ortalama $\frac{12}{10} = \frac{6}{5}$ araç geçmektedir. $t = 1,2$

$P(x) = 1,2^x \, e^{-1,2}$ $\qquad f(t) = 1.2e^{-1.2t}$

$P(t<100) = \int_0^{100} 1.2e^{-1.2t} \, dt = 1 - e^{-1,2(100)} = 1 - e^{-120}$