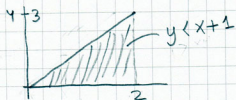① 



$y < x+1$

$$\int_0^2 \int_0^{x+1} c(x+y) \, dy \, dx = 1$$

$$c \int_0^2 \left[ xy + \frac{y^2}{2} \right]_0^{x+1} dx = 1$$

$$c \int_0^2 \left( x(x+1) + \frac{(x+1)^2}{2} \right) dx = 1$$

$$c \int_0^2 \frac{2x^2 + 2x + x^2 + 2x + 1}{2} \, dx = 1$$

$$c \int_0^2 \frac{3x^2 + 4x + 1}{2} \, dx = 1$$

$$c \left[ \frac{3x^3}{3 \cdot 2} + \frac{4x^2}{2 \cdot 2} + \frac{x}{2} \right]_0^2 = 1$$

$$c \left[ \frac{8}{2} + 4 + 1 \right] = 1$$

$$c = 0.1111$$

② $f_X(x) = \int_0^{x+1} \frac{1}{9}(x+y)\,dy$    $0 < x < 2$

$= \frac{1}{9}\left[xy + \frac{y^2}{2}\right]_0^{x+1} dy$

$= \frac{1}{9}\left[x(x+1) + \frac{x^2+2x+1}{2}\right]$

$= \boxed{\frac{1}{9} \cdot \frac{3x^2 + 4x + 1}{2}}$    $in$  $0 < x < 2$

③ $P(Y \leq 2 \mid X = 1.5) = P$    $olsun$

$f_{Y|X=x} = \frac{f(x,y)}{f_X(x)}$

$f_{Y|X=1.5} = \dfrac{\cancel{\frac{1}{9}}(1.5+y)}{\dfrac{\cancel{1}}{\cancel{9}}\dfrac{(3\times1.5^2+4\times1.5+1)}{2}}$

$= \frac{2(y+1.5)}{4.5+6+1}$

$= 0.1454\,(y+1.5)$

$P = \int_0^2 f_{Y|X=1.5}\,dy = 0.1739\left[\frac{y^2}{2} + 1.5y\right]_0^2$

$= 0.1454\,[2+3] \cong \boxed{0.7273}$

④ $\mu_{Y|X=1.5} = \int_0^{1.5+1} y \cdot f_{Y|X=1.5} \, dy$

$= \int_0^{2.5} y \cdot 0.1454 (y + 1.5)$

$= 0.1454 \left[ \frac{y^3}{3} + \frac{1.5 y^2}{2} \right]_0^{2.5}$

$= 0.1454 \left[ \frac{2.5^3}{3} + 1.5 \frac{2.5^2}{2} \right]$

$= \boxed{1.4394}$

⑤ $\mu_X = \int_0^2 \int_0^{x+1} x \cdot f_{xy}(x,y) \, dy \, dx$

$= C \cdot \int_0^2 \int_0^{x+1} (x^2 + xy) \, dy \, dx$

$= C \int_0^2 \left[ x^2 + x(x+1) \right] dx$

$= C \left[ \frac{2x^3}{3} + \frac{x^2}{2} \right]_0^2$

$= C \cdot \left( \frac{2 \cdot 8}{3} + \frac{4}{2} \right) \stackrel{\sim}{=} \boxed{0.7037}$

$\mu_y = \int_0^2 \int_0^{x+1} y (cx + cy) \, dy \, dx$

$= C \int_0^2 \left( \frac{y^2 x}{2} + \frac{y^3}{3} \right) \Big|_0^{x+1} = \cdots = ①$

$E(T) = 0.5 \mu_X + 1.5 \mu_y = \boxed{1.8519}$