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MAT 361
section : 04

SET - 3

1. $f(x, y) = xy$. $\quad$ $0 < x < 1,\ 0 < y < 2$

~~$cdf = F(x,y) = \int_0^2 \int_0^1 xy \, dx \, dy$~~

$= \int_0^2 \left[\frac{x^2}{2}\right]_0^1 y \, dy$.

$= \left[\frac{1^2}{2} - 0\right]$

~~$E(x) = \int_{0.5}^{1}$~~

$P(0.5 < x, y < 1)$

$= \int_0^1 \int_{0.5}^1 xy \, dx \, dy$

$= \int_0^1 \left[\frac{x^2}{2}\right]_{0.5}^1 y \, dy$

$= \int_0^1 \left(\frac{1}{2} - \frac{1}{8}\right) y \, dy$

$= \frac{3}{8} \left[\frac{y^2}{2}\right]_0^1$

$= \frac{3}{8} \cdot \frac{1}{2} = 3/16$ Answer

covariance, $cov(x, y) = E(xy) - E(x) \cdot E(y)$

~~$E(x) = \int_0^1 xy$~~

$g(x) = \int_0^2 xy \, dy$.

$= x \left[\frac{y^2}{2}\right]_0^2 = x \cdot \frac{2^2}{2} = 2x$.

$$h(y) = \int_0^1 xy\,dx$$
$$= y\left[\frac{x^2}{2}\right]_0^1$$
$$= y \cdot \frac{1}{2} = \frac{1}{2}y.$$

$$E(x) = \int_0^1 x\,g(x)\,dx$$
$$= \int_0^2 2x^2\,dx$$
$$= 2\left[\frac{x^3}{3}\right]_0^1$$
$$= 2 \cdot \left[\frac{1}{3} - 0\right]$$
$$= 2/3$$

$$E(y) = \int_0^2 y\,h(y)\,dy$$
$$= \int_0^2 \frac{1}{2}y^2\,dy$$
$$= \frac{1}{2}\left[y^3/3\right]_0^2$$
$$= \frac{1}{2}\left[\frac{2^3}{3}\right]$$
$$= \frac{4}{3}$$

$$E(xy) = \int_0^2\int_0^1 xy \cdot xy\,dx\,dy$$
$$= \int_0^2 \left[\frac{x^3}{3}\right]_0^1 y^2\,dy. = \int_0^2 \frac{1}{3}y^2\,dy.$$
$$= \frac{1}{3}\left[\frac{y^3}{3}\right]_0^2 = \frac{1}{3} \times \frac{8}{3} = \frac{8}{9}.$$

covariance, $cov(x,y) = E(xy) - E(x)\,E(y)$

$$= \frac{8}{9} - \frac{2}{3} \times \frac{4}{3}$$

$$= \frac{8}{9} - \frac{8}{9}$$

$$= 0.$$

There are no relation between two ~~var~~ variable x and y. Because $cov = 0$ as well as $corr = 0$.