

- (1) The joint probability density of two random variables X and Y is

$$f(x, y) = \begin{cases} 2(2x + 3y)/5; & 0 \leq x, y \leq 1 \\ 0; & elsewhere \end{cases}$$

Then write a R-code to

- (i) check that it is a joint density function or not? (Use `integral2()`)
- (ii) find marginal distribution $g(x)$ at $x = 1$.
- (iii) find the marginal distribution $h(y)$ at $y = 0$.
- (iv) find the expected value of $g(x, y) = xy$.

- (2) The joint probability mass function of two random variables X and Y is

$$f(x, y) = \{(x + y)/30; \ x = 0, 1, 2, 3; \ y = 0, 1, 2\}$$

Then write a R-code to

- (i) display the joint mass function in rectangular (matrix) form.
- (ii) check that it is joint mass function or not? (use: `Sum()`)
- (iii) find the marginal distribution $g(x)$ for $x = 0, 1, 2, 3$. (Use: `apply()`)
- (iv) find the marginal distribution $h(y)$ for $y = 0, 1, 2$. (Use: `apply()`)
- (v) find the conditional probability at $x = 0$ given $y = 1$.
- (vi) find $E(x), E(y), E(xy), Var(x), Var(y), Cov(x, y)$ and its correlation coefficient.