AI1110 Assignment 1 in LaTeX

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11.16.3.5 Given that a fair coin is marked 1 on one face and 6 on the other and a fair die are tossed.find the probability sum turns up to be 3 and 12

Solution: Let X be the random variable representing the outcome of coin toss and Y be a random variable representing die toss

we know :

$$M_{x+y}(t) = M_x(t) \times M_y(t) \tag{1}$$

(2)

$$y \in \{1, 2, 3, 4, 5, 6\}$$

$$x \in \{1, 6\}$$

$$\therefore M_y(t) = \frac{1}{6} \times e^t + \frac{1}{6} \times e^t + \frac{1}{6} \times e^t + \frac{1}{6} \times e^t + \frac{1}{6} \times e^t + \frac{1}{6} \times e^t \tag{3}$$

(4)

$$\therefore M_x(t) = \frac{1}{2} \times e^t + \frac{1}{2} \times e^{6t}$$

$$M_{x+y}(t) = \frac{1}{12} \times e^t + \frac{1}{12} \times e^{2t} + \frac{1}{12} \times e^{3t} + \frac{1}{12} \times e^{4t} + \frac{1}{12} \times e^{5t} + \frac{1}{12} \times e^{6t} \tag{5}$$

$$+\frac{1}{12} \times e^{7t} + \frac{1}{12} \times e^{8t} + \frac{1}{12} \times e^{9t} + \frac{1}{12} \times e^{10t} + \frac{1}{12} \times e^{11t} + \frac{1}{12} e^{12t} \tag{6}$$

(a) sum turns up to be 3 is coefficient of e^{3t} in $M_{x+y}(t)$

$$\therefore \Pr(x + y = 3) = \frac{1}{12}$$

(b)sum turns up to be 12 is coefficient of e^{12t} in $M_{x+y}(t)$

$$\therefore \Pr(x + y = 12) = \frac{1}{12}$$

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