

Chapter 13 연습문제 정답

1.

$$(a) P(Y_n = -1) = \frac{1}{3}, P(Y_n = 1) = \frac{2}{3}$$

$$(b) E(Y_n) = \frac{1}{3}, Var(Y_n) = \frac{8}{9}$$

$$2. P[X(s) = k | X(t) = n] = \binom{n}{k} \left(\frac{s}{t}\right)^k \left(1 - \frac{s}{t}\right)^{n-k}$$

3.

$$(a) F_{X(t)}(x) = \begin{cases} 0 & , x < 0 \\ 1 - \exp\left(-\frac{2x}{|\cos(2t+\pi)|}\right) & , x \geq 0 \end{cases}$$

$$(b) f_{X(t)}(x) = \delta(x)$$

$$(c) E[X(t)] = \frac{1}{2} |\cos(2t+\pi)|$$

4.

$$(a) F_{X(t)}(x) = \begin{cases} 0 & , x < 0 \\ \frac{1}{2} \left(\frac{x}{|\sin(3t+\pi)|} + 1 \right) & , x \geq 0 \end{cases}$$

$$(b) f_{X(t)}(x) = \delta(x)$$

$$(c) E[X(t)] = 0$$

5.

$$\text{분포함수} : F_{X(t)}(x) = \begin{cases} e^{-2(t-x)}, & x \leq t \\ 1 & , x > t \end{cases}$$

$$\text{확률밀도함수} : f_{X(t)}(x) = \begin{cases} 2e^{-2(t-x)}, & x \leq t \\ 0 & , x > t \end{cases}$$

6.

$$(a) 0.2$$

$$(b) 5(\text{분})$$

$$(c) (0.2)(0.8)^9 \approx 0.0268$$

$$(d) 20(\text{분})$$

7.

$$(a) \frac{2187}{524288}$$

$$(b) \frac{11}{4}$$

8.

$$(a) \mathbf{P} = \begin{pmatrix} 0 & 0.4 & 0 & 0.6 \\ 0.1 & 0 & 0.1 & 0.8 \\ 0 & 0.5 & 0 & 0.5 \\ 0 & 0 & 0 & 1.0 \end{pmatrix}$$

$$(b) \mathbf{P} = \begin{pmatrix} 0 & 0.4 & 0.6 & 0 & 0 & 0 \\ 0.2 & 0 & 0.5 & 0.3 & 0 & 0 \\ 1.0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.2 & 0.8 \\ 0 & 0 & 0 & 0 & 0.4 & 0.6 \\ 0 & 0 & 0 & 0.5 & 0.5 & 0 \end{pmatrix}$$

$$(c) \mathbf{P} = \begin{pmatrix} 0.6 & 0.4 & 0 & 0 & 0 & \cdots \\ 0.2 & 0.4 & 0.4 & 0 & 0 & \cdots \\ 0 & 0.2 & 0.4 & 0.4 & 0 & \cdots \\ 0 & 0 & 0.2 & 0.4 & 0.4 & \cdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

9.

- (a) 0.5
- (b) 0.368
- (c) 0.6
- (d) 0.24

10.

- (a) $\{0, 1, 2, 3\}$ 은 기약동치류이다.
- (b) $\{0, 1\}, \{2, 3\}$
- (c) $\{0\}, \{1, 2\}, \{3\}$
- (d) $\{0\}, \{1\}, \{2, 3\}$

11.

- (a) $d(0) = d(1) = d(2) = d(3) = 1$
- (b) $d(0) = d(1) = 1, d(2) = d(3) = 1$
- (c) $d(0) = d(3) = 1, d(1) = d(2) = 2$
- (d) $d(0) = d(1) = 1, d(2) = d(3) = 2$

12.

상태 0과 1은 일시적이다.
상태 2와 3은 재귀적이다.