

처음 만나는

디지털 논리회로

## Chapter 05 불 대수

### 기출문제 풀이

## 1. 논리식 중 성립되지 않는 것은?

㉠  $A \cdot A = A$

㉡  $A = \overline{\overline{A}}$

㉢  $A + \overline{A} = A$

㉣  $A \cdot \overline{A} = 0$

㉤  $A + \overline{A} = 1$

## 2. 다음 불 대수 공식 중 틀린 것은?

㉠  $X + 0 = 0$

㉡  $X + X = X$

㉢  $X \cdot \overline{X} = 0$

㉣  $X \cdot X = X$

㉤  $X + 0 = X$

### 3. 불 대수식 중 옳지 않은 것은?

㉠  $A \cdot 1 = A$

㉡  $A+1 = 1$

㉢  $A \cdot \bar{A} = 0$

㉣  $A+\bar{A} = 0$

㉤  $A + \bar{A} = 1$

### 4. 다음 논리식 중 틀린 것은?

㉠  $A+0 = A$

㉡  $A \cdot 0 = 0$

㉢  $A \cdot 1 = 1$

㉣  $A+1 = 1$

㉤  $A \cdot 1 = A$

## 5. 다음 중 논리식이 틀린 것은?

㉠  $A+1 = A$

㉡  $A+A = A$

㉢  $A \cdot A = A$

㉣  $A+A \cdot B = A$

㉤  $A + 1 = 1$

㉥  $A + AB = A(1+B) = A \cdot 1 = A$

## 6. 다음 불 대수의 관계식이 옳지 않은 것은?

㉠  $X(Y+Z) = XY + XZ$

㉡  $\overline{(XY)} = \overline{X} + \overline{Y}$

㉢  $X \cdot X = 1$

㉣  $X + X = X$

㉤  $X \cdot X = X$

## 7. 불 대수(Boolean algebra)가 옳지 않은 것은?

㉠  $A + \overline{A}B = A$

㉡  $A \cdot A = A$

㉢  $A + A\overline{B} = A$

㉣  $A(A + B) = A$

㉠  $A + \overline{A}B = A(\overline{B} + B) + \overline{A}B = A\overline{B} + AB + \overline{A}B$   
 $= A\overline{B} + AB + \overline{A}B + AB = A(\overline{B} + B) + (\overline{A} + A)B = A + B$

㉢  $A + A\overline{B} = A(1 + \overline{B}) = A \cdot 1 = A$

㉣  $A(A + B) = AA + AB = A + AB = A(1 + B) = A \cdot 1 = A$

## 8. 불 대수에 관한 정리 중 옳지 않은 것은?

㉠  $A + A = A$

㉡  $A\bar{A} = 0$

㉢  $A + AB = A$

㉣  $A + \overline{AB} = A + B$

---

㉤  $A + AB = A(1 + B) = A \cdot 1 = A$

㉥  $A + \overline{AB} = A + \bar{A} + \bar{B} = 1 + \bar{B} = 1$

## 9. 다음 중 불 대수 정리로 옳지 않은 것은?

㉠  $B + \overline{B} = 1$

㉡  $AB + A\overline{B} = B$

㉢  $(A + B)(A + \overline{B}) = A$

㉣  $A(\overline{A} + B) = AB$

㉡  $AB + A\overline{B} = A(B + \overline{B}) = A \cdot 1 = A$

㉢  $(A + B)(A + \overline{B}) = AA + A\overline{B} + AB + B\overline{B} = A + A\overline{B} + AB = A(1 + \overline{B} + B) = A \cdot 1 = A$

㉣  $A(\overline{A} + B) = A\overline{A} + AB = AB$

## 10. 불 대수의 법칙에 어긋나는 것은?

㉠  $\overline{AB} + \overline{AB} = A + B$

㉡  $A + AB = A$

㉢  $A + \overline{AB} = A + B$

㉣  $(A + B) \cdot (A + C) = A + B \cdot C$

㉠  $\overline{AB} + \overline{AB} = A \oplus B$

㉡  $A + AB = A(1 + B) = A \cdot 1 = A$

㉢  $A + \overline{AB} = A(\overline{B} + B) + \overline{AB} = A\overline{B} + AB + \overline{AB}$   
 $= A\overline{B} + AB + \overline{AB} + AB = A(\overline{B} + B) + (\overline{A} + A)B = A + B$

㉣  $(A + B) \cdot (A + C) = AA + AC + AB + BC = A(1 + C + B) + BC = A + B \cdot C$

## 11. 불 대수의 정리 중 옳지 않은 것은?

㉠  $A + B = B + A$

㉡  $A + B \cdot C = (A + B)(A + C)$

㉢  $A + \bar{A} = 1$

㉣  $A \cdot B = \overline{\overline{A + B}}$

㉤  $\overline{A + B} = \bar{A} \cdot \bar{B}$

## 12. 다음 불 대수의 정리 중 틀린 것은?

㉠  $A + AB = A$

㉡  $A(A + B) = B$

㉢  $A + \bar{A}B = A + B$

㉣  $A(\bar{A} + AB) = AB$

㉤  $A(A + B) = AA + AB = A + AB = A(1 + B) = A$

㉥  $A(\bar{A} + AB) = A\bar{A} + AAB = AB$

### 13. 다음 불 함수의 대수식이 옳지 않은 것은?

㉠  $\overline{X \cdot Y} = \overline{X} + \overline{Y}$

㉡  $X \cdot \overline{X} = 0$

㉢  $X + X = 2X$

㉣  $X + \overline{X}Y = X + Y$

㉤  $X + X = X$

### 14. 다음 불 대수 중 옳지 않은 것은?

㉠  $X + XY = X$

㉡  $X\overline{Y} + Y = X + Y$

㉢  $(X + Y)(X + \overline{Y}) = \overline{X}$

㉣  $XY + \overline{X}Z + YZ = XY + \overline{X}Z$

㉤  $(X + Y)(X + \overline{Y}) = XX + X\overline{Y} + XY + Y\overline{Y} = X + X\overline{Y} + XY = X(1 + \overline{Y} + Y) = X$

## 15. 다음 불 대수의 정리와 관련 있는 것은?

$$(A + B) + C = A + (B + C)$$

㉠ 교환법칙

㉡ 결합법칙

㉢ 분배법칙

㉣ 부정법칙

## 16. 논리식 $A+AB=A$ 의 불 대수 정리는?

㉠ 결합법칙

㉡ 교환법칙

㉢ 분배법칙

㉣ 흡수법칙

㉣ 흡수법칙 :  $A + AB = A(1 + B) = A$

## 17. 다음 논리회로 법칙 중 서로 **잘못** 연결된 것은?

- ㉠ 교환법칙 :  $A + B = B + A$
- ㉡ 결합법칙 :  $A \cdot (B + C) = A \cdot B + A \cdot C$
- ㉢ 분배법칙 :  $A + (B \cdot C) = (A + B) \cdot (A + C)$
- ㉣ 드모르간의 법칙 :  $\overline{A \cdot B} = \overline{A} + \overline{B}$

㉡  $A \cdot (B + C) = A \cdot B + A \cdot C$   $\Leftarrow$  분배법칙

## 18. 드모르간(De Morgan)의 정리에 속하는 식은?

- ㉠  $A + \overline{A} = 1$
- ㉡  $(A \cdot B) \cdot C = A \cdot (B \cdot C)$
- ㉢  $\overline{A \cdot B} = \overline{A} + \overline{B}$
- ㉣  $A + B = B + A$

드모르간의 정리 :  $\overline{A \cdot B} = \overline{A} + \overline{B}$      $\overline{A + B} = \overline{A} \cdot \overline{B}$

## 19. 드모르간(De Morgan)의 정리를 옳게 나타낸 것은?

㉠  $\overline{A+B} = A+B$

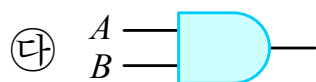
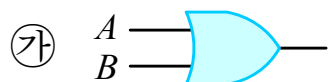
㉡  $\overline{A+B} = A \cdot B$

㉢  $\overline{A+B} = \overline{A} \cdot \overline{B}$

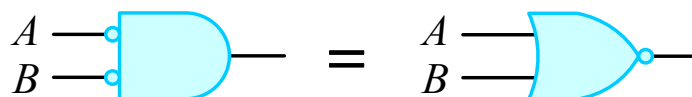
㉣  $\overline{A+B} = \overline{A} + \overline{B}$

드모르간의 정리 :  $\overline{A \cdot B} = \overline{A} + \overline{B}$        $\overline{A+B} = \overline{A} \cdot \overline{B}$

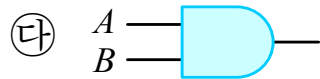
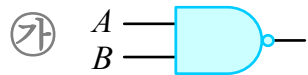
## 20. $\overline{A} \overline{B}$ 를 드모르간의 정리에 의해서 올바르게 변환시킨 회로는?



㉡  $\overline{A} \overline{B} = \overline{A+B}$



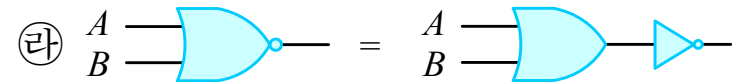
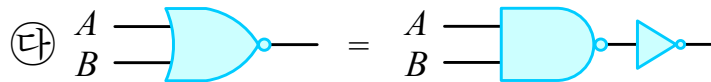
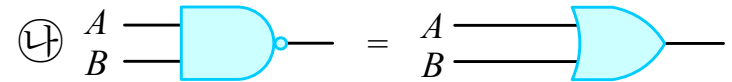
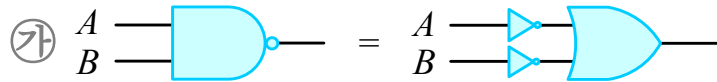
## 21. 다음 중 논리식 $\overline{A+B}$ 와 등가인 회로는?



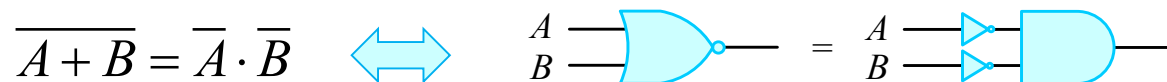
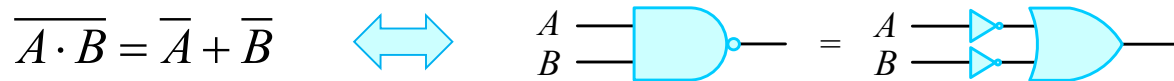
드모르간(De Morgan)의 정리

$$\overline{A+B} = \overline{A} \cdot \overline{B} \quad \Rightarrow \quad \begin{array}{c} A \\ B \end{array} \begin{array}{c} \text{NOR} \end{array} = \begin{array}{c} A \\ B \end{array} \begin{array}{c} \text{AND} \end{array}$$

## 22. 다음의 논리회로도에서 드모르간(De Morgan)의 정리를 나타내는 것은 어느 것인가?



### 드모르간(De Morgan)의 정리



## 23. 다음 논리식은 무슨 법칙을 활용하여 전개한 것인가?

$$F = \overline{C}(\overline{AB}) = \overline{C}(\overline{A} + \overline{B}) = \overline{C + AB} = \overline{AB + C}$$

- ㉠ 보수와 병렬의 법칙
- ㉡ 드모르간(De Morgan)의 법칙
- ㉢ 교차와 병렬의 법칙
- ㉣ 적(積)과 화(和)의 분배의 법칙

## 24. $A + \overline{A} = 1$ 의 쌍대인 것을 표시한 식은?

- ㉠  $A \cdot \overline{A} = 0$
- ㉡  $A \cdot \overline{A} = 1$
- ㉢  $A + \overline{A} = A$
- ㉣  $A + \overline{A} = 0$

### 쌍대성(duality)

불 대수 공리나 기본 법칙에서 좌우 한 쌍에서 0과 1을 서로 바꾸고 동시에 ‘ $\cdot$ ’과 ‘ $+$ ’를 서로 바꾸면 다른 한 쪽이 얻어지는 성질

## 25. 다음 중 결과가 다른 하나는?

㉠  $A(A+B)$

㉡  $A+AB$

㉢  $1 \cdot A$

㉣  $A+1$

---

㉠  $A(A+B) = AA+AB = A+AB = A(1+B) = A$

㉡  $A+AB = A(1+B) = A$

㉢  $1 \cdot A = A$

㉣  $A+1 = 1$

26. 다음 불(Boolean) 대수식을 간단히 한 결과  $Y$ 는?

$$Y = A\bar{A} + B$$

㉠  $Y = A$

㉡  $Y = B$

㉢  $Y = \bar{A}$

㉣  $Y = \bar{B}$

---

$$Y = A\bar{A} + B = B \quad (\because \bar{A}A = 0)$$

## 27. 논리식 $A+AB$ 를 간단히 한 결과는?

㉠  $A+B$

㉡  $A$

㉢  $B$

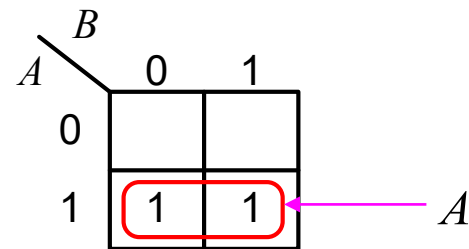
㉣  $1$

### • 불 대수 이용

$$A + AB = A(1 + B) = A$$

### • 카르노 맵 이용

$$A(\bar{B} + B) + AB = A\bar{B} + AB + AB = A\bar{B} + AB$$



## 28. 논리식 $\overline{A}+B+\overline{A}+\overline{B}$ 를 간소화하여 정리하면?

㉠  $\overline{A}$

㉡  $\overline{B}$

㉢ 1

㉣ B

$$\overline{A} + B + \overline{A} + \overline{B} = (\overline{A} + \overline{A}) + (B + \overline{B}) = \overline{A} + 1 = 1$$

## 29. 논리식 $Y = A + AB + AC$ 를 간소화하면?

㉠  $Y = A$

㉡  $Y = B$

㉢  $Y = A + B$

㉣  $Y = A + C$

$$Y = A + AB + AC = A(1 + B + C) = A$$

### 30. 논리식 $X = (A+B)(\overline{A \cdot B})$ 와 같은 것은?

㉠  $A + \overline{B}$

㉡  $\overline{A}B + A\overline{B}$

㉢  $A + B$

㉣  $\overline{A} + B$

$$\begin{aligned} X &= (A+B)(\overline{A \cdot B}) = (A+B)(\overline{A} + \overline{B}) \\ &= A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B \end{aligned}$$

### 31. 다음 논리식을 간단히 하면?

$$\overline{\overline{A+B} + \overline{A+B}}$$

㉠  $A+B$

㉡  $AB$

㉢  $A$

㉣  $B$

$$\overline{\overline{A+B} + \overline{A+B}} = \overline{A\overline{B} + \overline{A}B} = A(\overline{B} + B) = A$$

### 32. 다음 논리식 $\overline{AB} + A\overline{B} + AB$ 를 간단히 표현하면?

㉠  $A+B$

㉡  $\overline{A}+B$

㉢  $A+\overline{B}$

㉣  $\overline{A}+\overline{B}$

$$\overline{AB} + A\overline{B} + AB = A + \overline{B} + A\overline{B} + AB = A(1 + \overline{B} + B) + \overline{B} = A + \overline{B}$$

### 33. 다음 논리식 중 좌,우 항의 관계가 틀린 것은?

㉠  $(A+B)(\overline{A}+\overline{B}) = A\overline{B} + \overline{A}B$

㉡  $AB = \overline{A} + \overline{B}$

㉢  $(A+B)\overline{AB} = A\overline{B} + \overline{A}B$

㉣  $A \oplus B = A\overline{B} + \overline{A}B$

㉠  $(A+B)(\overline{A}+\overline{B}) = A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B$

㉡  $\overline{AB} = \overline{A} + \overline{B}$

㉢  $(A+B)\overline{AB} = (A+B)(\overline{A}+\overline{B}) = A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B$

### 34. 다음 불 대수식과 등가인 것은?

$$A + B \cdot C$$

㉠  $A \cdot B \cdot (A + C)$

㉡  $(A + B) \cdot (A + C)$

㉢  $(A + B) \cdot A \cdot C$

㉣  $(A + B) \cdot \overline{(A + C)}$

$$A + B \cdot C = (A + B)(A + C)$$

### 35. 불 대수식 $(A+B)(A+C)$ 와 등가인 것은?

㉠  $BC$

㉡  $ABC$

㉢  $A+B+C$

㉣  $A+BC$

$$A + B \cdot C = (A + B)(A + C)$$

### 36. 다음 논리식 $F$ 를 간소화한 것은?

$$F = \overline{A}(BC + B\overline{C}) + A(BC + B\overline{C})$$

㉠  $B$

㉡  $BC$

㉢  $AC$

㉣  $A+B\overline{C}$

$$\begin{aligned} F &= \overline{A}(BC + B\overline{C}) + A(BC + B\overline{C}) \\ &= (\overline{A} + A)(BC + B\overline{C}) \\ &= BC + B\overline{C} = B(C + \overline{C}) = B \end{aligned}$$

		BC			
A		00	01	11	10
	0			1	1
	1			1	1

B

### 37. 논리식 $\overline{B}(\overline{A}+C)(B+\overline{C})$ 를 간소화하면?

㉠  $ABC$

㉡  $\overline{A} \cdot \overline{B} \cdot \overline{C}$

㉢  $A + B + C$

㉣  $\overline{A} + \overline{B} + \overline{C}$

$$\begin{aligned}\overline{B}(\overline{A} + C)(B + \overline{C}) &= \overline{B}(\overline{A}B + \overline{A}\overline{C} + BC + C\overline{C}) \\ &= \overline{A}B\overline{B} + \overline{A}\overline{B}\overline{C} + B\overline{B}C + \overline{B}C\overline{C} = \overline{A}\overline{B}\overline{C}\end{aligned}$$

### 38. 논리식 $f = xy + wxy$ 를 간단히 하면?

㉠  $xy$

㉡  $w$

㉢  $wxy$

㉣  $wx$

$$f = xy + wxy = xy(1 + w) = xy$$

### 39. 논리식 $\overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C}$ 를 간소화하면?

㉠  $A\overline{C}$

㉡  $\overline{A}C$

㉢  $AC$

㉣  $AB$

$$\overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C} = \overline{A}\overline{C}(\overline{B} + B) = \overline{A}\overline{C}$$

		BC			
A	0	00	01	11	10
	1	1			1

Diagram illustrating a Karnaugh map for the expression  $\overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C}$ . The map shows two 1s in the first column (A=0, BC=00) and the fifth column (A=1, BC=10). A red circle groups these two 1s, and a pink arrow points to the group with the label  $\overline{A}\overline{C}$ .

### 40. 다음 불 대수식을 간소화할 때 맞는 것은?

$$RST + RS(\overline{T} + V)$$

㉠  $R\overline{S}\overline{T}$

㉡  $RSV$

㉢  $RST$

㉣  $RS$

$$RST + RS(\overline{T} + V) = RS(T + \overline{T} + V) = RS(1 + V) = RS$$

## 41. 논리식 $\overline{A}\overline{B} + \overline{A}\overline{B}C + \overline{A}\overline{B}(D + E)$ 를 간단히 하면?

㉠  $\overline{A}\overline{B}(D + E)$

㉡  $\overline{A}\overline{B}(D + E)$

㉢  $\overline{A}\overline{B}$

㉣  $\overline{A}\overline{B}$

$$\overline{A}\overline{B} + \overline{A}\overline{B}C + \overline{A}\overline{B}(D + E) = \overline{A}\overline{B}(1 + C + (D + E)) = \overline{A}\overline{B}$$

## 42. 다음 논리식을 간단히 하면?

$$Y = \overline{(A + B)\overline{C}\overline{D} + E + \overline{F}}$$

㉠  $Y = (\overline{A}\overline{B} + C + D)\overline{E}\overline{F}$

㉡  $Y = (\overline{A}\overline{B} + C + D)\overline{E}\overline{F}$

㉢  $Y = (\overline{A}\overline{B} + C + D)\overline{E}\overline{F}$

㉣  $Y = (\overline{A}\overline{B} + \overline{C} + \overline{D})\overline{E}\overline{F}$

$$\begin{aligned} Y &= \overline{(A + B)\overline{C}\overline{D} + E + \overline{F}} = \overline{(A + B)\overline{C}\overline{D}} \cdot \overline{E} \cdot \overline{\overline{F}} \\ &= (\overline{A + B} + \overline{\overline{C}} + \overline{\overline{D}})\overline{E}F = (\overline{A}\overline{B} + C + D)\overline{E}F \end{aligned}$$

### 43. 다음과 같이 주어지는 논리식을 불 대수를 적용하여 간소화한 것은?

$$Z = (A + \overline{BC} + D + EF)(A + \overline{BC} + \overline{D + EF})$$

㉠  $Z = D + EF$

㉡  $Z = \overline{BC} + D + EF$

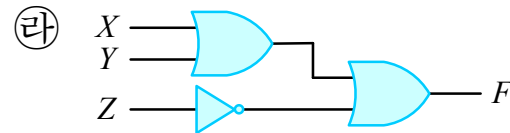
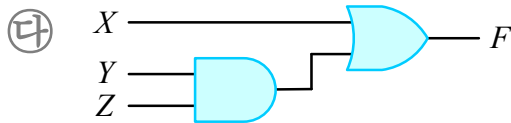
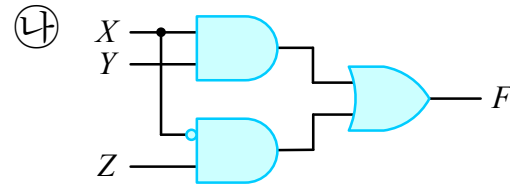
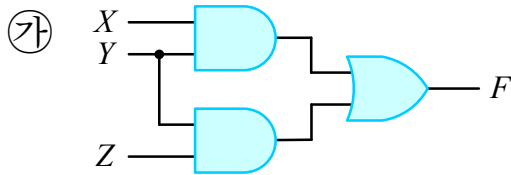
㉢  $Z = A + \overline{BC}$

㉣  $Z = A + D$

$$\begin{aligned} Z &= (A + \overline{BC} + D + EF)(A + \overline{BC} + \overline{D + EF}) \\ &= (A + \overline{BC})(A + \overline{BC}) + (A + \overline{BC})(\overline{D + EF}) + (D + EF)(A + \overline{BC}) + (D + EF)(\overline{D + EF}) \\ &= (A + \overline{BC})(1 + \overline{D + EF} + D + EF) = A + \overline{BC} \end{aligned}$$

## 44. 다음 논리식을 만족시키는 회로는?

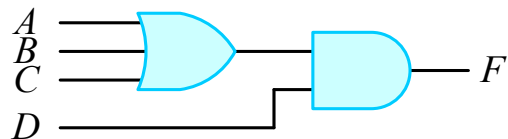
$$F(X, Y, Z) = (X + Y + XY)(X + Z)$$



$$\begin{aligned}
 F(X, Y, Z) &= (X + Y + XY)(X + Z) \\
 &= (X + Y(1 + X))(X + Z) \\
 &= (X + Y)(X + Z) \\
 &= XX + XZ + XY + YZ \\
 &= X(1 + Z + Y) + YZ \\
 &= X + YZ
 \end{aligned}$$

## 45. 다음과 같은 논리회로의 출력 $F$ 를 나타낸 논리식은?

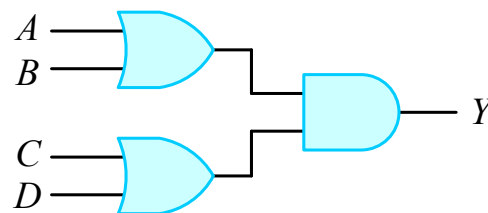
- ㉠  $(ABC)D$
- ㉡  $(ABC)+D$
- ㉢  $(A+B+C)D$
- ㉣  $A+B+C+D$



$$F = (A + B + C)D$$

## 46. 다음 논리회로의 논리식은?

- ㉠  $Y = AB + CD$
- ㉡  $Y = (A + B)(C + D)$
- ㉢  $Y = AB(C + D)$
- ㉣  $Y = (A + B) + (C + D)$



$$Y = (A + B)(C + D)$$

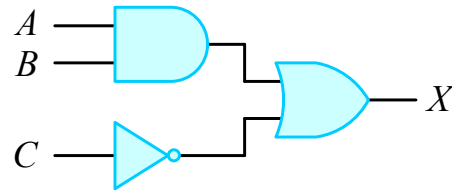
## 47. 다음과 같은 논리 회로의 출력 $X$ 는?

㉠  $(A + B)\overline{C}$

㉡  $ABC$

㉢  $\overline{AB} + C$

㉣  $AB + \overline{C}$



$$X = AB + \overline{C}$$

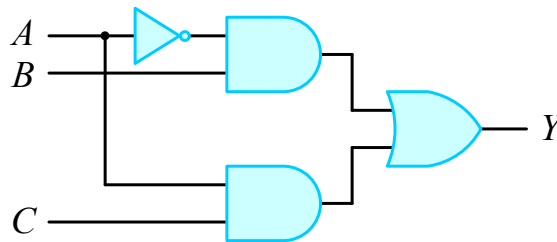
## 48. 다음 논리회로의 불 대수식 표현은?

㉠  $Y = \overline{A}B + AC$

㉡  $Y = \overline{A}BC$

㉢  $Y = \overline{A}\overline{B} + C$

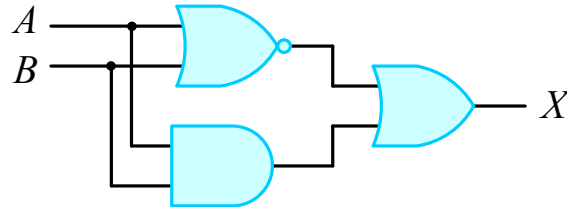
㉣  $Y = \overline{A} + B + C$



$$Y = \overline{A}B + AC$$

## 49. 다음과 같은 논리회로의 출력 $X$ 는?

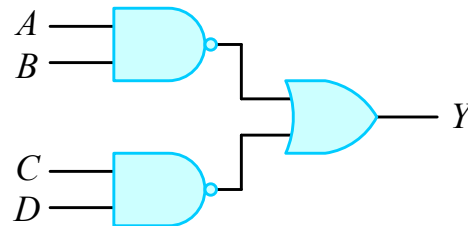
- ㉠  $X = \overline{(A+B)} \cdot \overline{(A \cdot B)}$
- ㉡  $X = (A+B) \cdot \overline{(A \cdot B)}$
- ㉢  $X = \overline{(A+B)} + (A \cdot B)$
- ㉣  $X = (A+B) + (A \cdot B)$



$$X = \overline{(A+B)} + (A \cdot B)$$

## 50. 다음 회로를 논리식으로 표시한 것 중 옳은 것은?

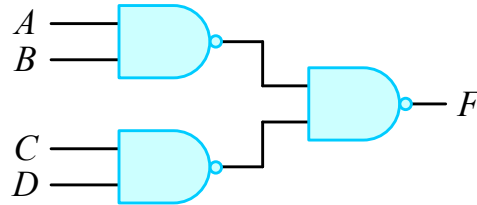
- ㉠  $Y = \overline{AB} + \overline{CD}$
- ㉡  $Y = (A+B)(C+D)$
- ㉢  $Y = AB + CD$
- ㉣  $Y = \overline{A+B} + \overline{C+D}$



$$Y = \overline{AB} + \overline{CD}$$

## 51. 다음 논리회로의 출력 $F$ 는?

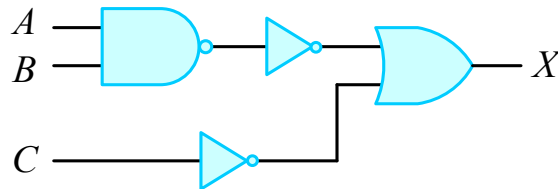
- ㉠  $\overline{AB + CD}$
- ㉡  $\overline{(A + B)(C + D)}$
- ㉢  $(A + B)(C + D)$
- ㉣  $AB + CD$



$$F = \overline{\overline{AB}} \cdot \overline{\overline{CD}} = \overline{\overline{AB}} + \overline{\overline{CD}} = AB + CD$$

## 52. 다음과 같은 회로의 출력 $X$ 는?

- ㉠  $\overline{AB + \overline{C}}$
- ㉡  $\overline{AB + C}$
- ㉢  $A + BC$
- ㉣  $\overline{A} + BC$



$$X = \overline{AB + \overline{C}}$$

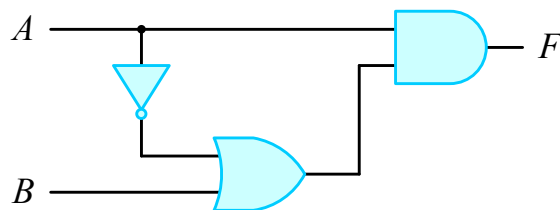
### 53. 다음과 같은 회로도의 출력 $F$ 는?

㉠  $A(\bar{A} + B)$

㉡  $\bar{A}(A + B)$

㉢  $A(A + B)$

㉣  $A(\bar{A} + \bar{B})$



$$F = A(\bar{A} + B)$$

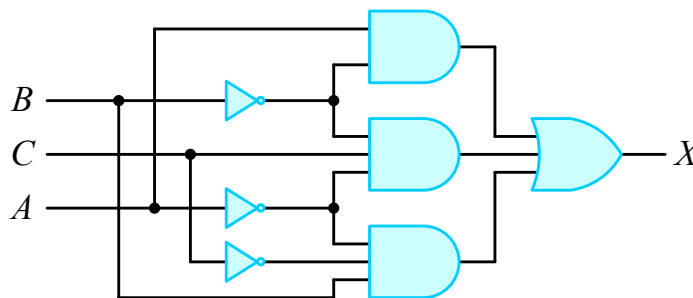
### 54. 다음과 같은 논리회로를 논리식으로 표시하면?

㉠  $X = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}$

㉡  $X = ABC + A\bar{B}\bar{C} + \bar{A}B$

㉢  $X = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}$

㉣  $X = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}$



$$X = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}$$

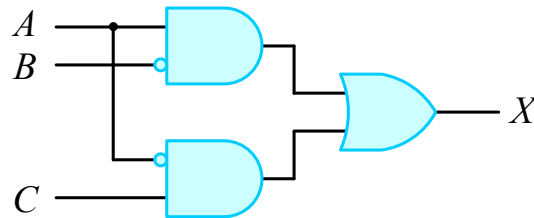
55. 다음과 같은 논리회로의 출력  $X$ 를 논리식으로 옳게 나타낸 것은?

㉠  $AB + AC$

㉡  $A\bar{B} + \bar{A}C$

㉢  $\overline{AB + AC}$

㉣  $A\bar{B} + \bar{A}C$



$$X = A\bar{B} + \bar{A}C$$

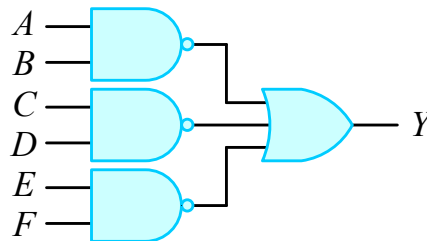
56. 다음 논리회로의 논리 출력식으로 옳은 것은?

㉠  $Y = \overline{AB \cdot CD \cdot EF}$

㉡  $Y = \overline{AB + CD + EF}$

㉢  $Y = AB + CD + EF$

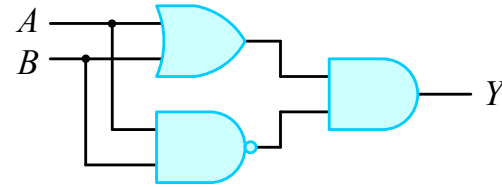
㉣  $Y = \overline{AB \cdot CD \cdot EF}$



$$Y = \overline{AB + CD + EF} = \overline{AB \cdot CD \cdot EF}$$

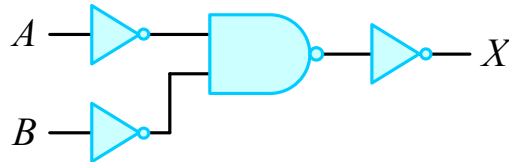
## 57. 다음과 같은 논리 회로의 출력 $Y$ 는?

- ㉠  $AB + \overline{A}B$       ㉡  $(A + \overline{B})\overline{A}\overline{B}$   
 ㉢  $AB(\overline{A} + \overline{B})$       ㉣  $(A + B)(\overline{A} + \overline{B})$



$$(A + B)(\overline{A}\overline{B}) = (A + B)(\overline{A} + \overline{B})$$

## 58. 다음 논리회로를 간단히 하면?

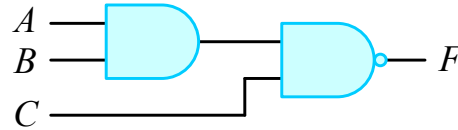


- ㉠  $A$  —  $B$  —  $X$       ㉡  $A$  —  $B$  —  $X$   
 ㉢  $A$  —  $B$  —  $X$       ㉣  $A$  —  $B$  —  $X$

$$X = \overline{A}\overline{B} = \overline{A + B}$$

## 59. 다음과 같은 논리회로의 출력은?

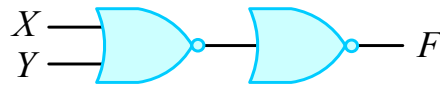
- ㉠  $A + B\bar{C}$
- ㉡  $\overline{AB} + \bar{C}$
- ㉢  $ABC$
- ㉣  $A + B + C$



$$\overline{ABC} = \overline{AB} + \bar{C} = \bar{A} + \bar{B} + \bar{C}$$

## 60. 다음 그림은 무슨 게이트를 나타낸 것인가?

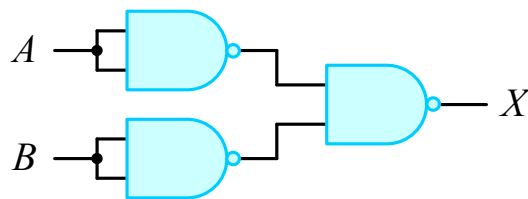
- ㉠ AND
- ㉡ OR
- ㉢ NOR
- ㉣ NAND



$$F = \overline{\overline{X + Y}} = X + Y$$

## 61. 다음 논리회로를 한 개의 게이트로 표현하였을 때 옳은 것은?

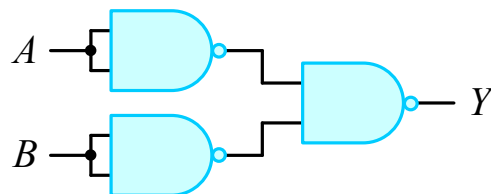
- ㉠ AND 게이트
- ㉡ OR 게이트
- ㉢ NAND 게이트
- ㉣ NOR 게이트



$$X = \overline{\overline{A} \cdot \overline{B}} = A + B$$

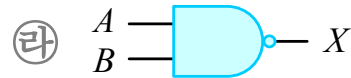
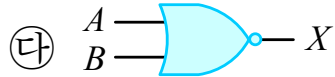
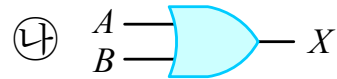
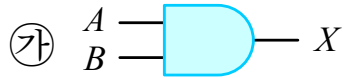
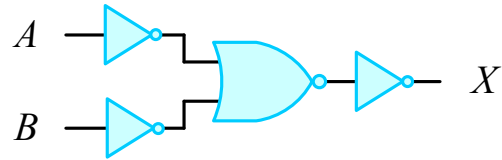
## 62. 다음 논리회로의 출력 Y가 0이 될 입력의 조합은?

- ㉠ A=0, B=0
- ㉡ A=0, B=1
- ㉢ A=1, B=0
- ㉣ A=1, B=1



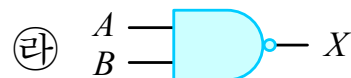
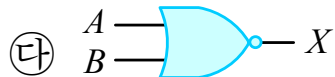
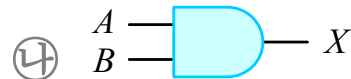
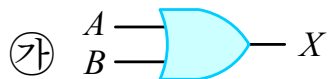
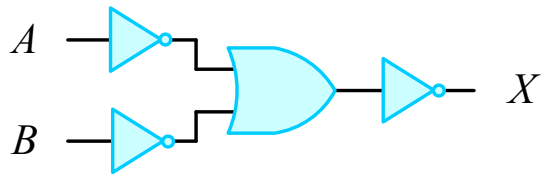
$$Y = \overline{\overline{A} \cdot \overline{B}} = \overline{\overline{A}} + \overline{\overline{B}} = A + B$$

### 63. 다음 논리회로를 간단히 하면?



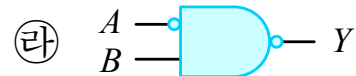
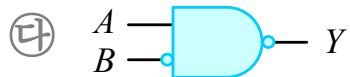
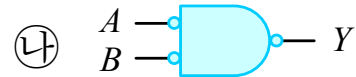
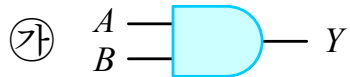
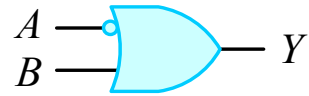
$$X = \overline{A + B} = \overline{A} \cdot \overline{B}$$

### 64. 다음 논리회로를 간소화하면?



$$X = \overline{\overline{A} + \overline{B}} = \overline{\overline{A}} \cdot \overline{\overline{B}} = A \cdot B$$

## 65. 다음 그림과 등가인 게이트는?



$$Y = \overline{A} + B$$

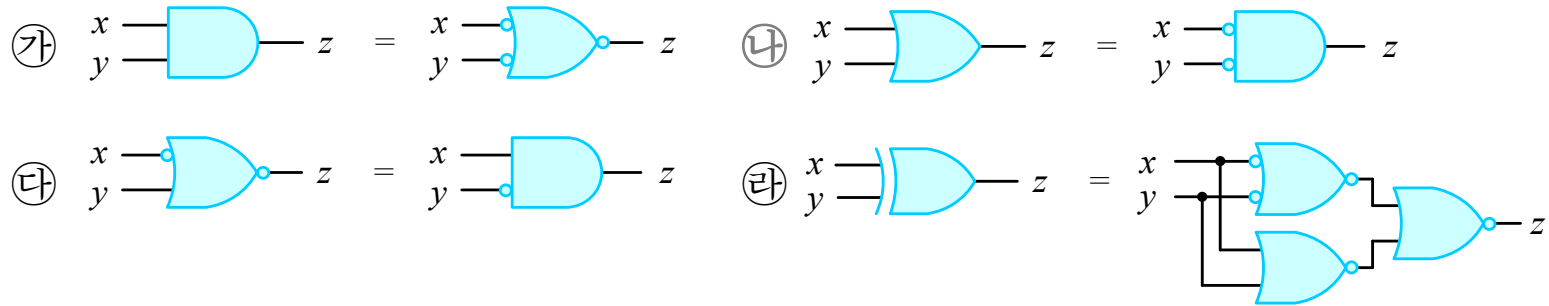
㉠  $Y = A + B$

㉡  $Y = \overline{\overline{A}\overline{B}} = \overline{\overline{A}} + \overline{\overline{B}} = A + B$

㉢  $Y = \overline{\overline{A}\overline{B}} = \overline{\overline{A}} + B$

㉣  $Y = \overline{\overline{A}\overline{B}} = A + \overline{B}$

## 66. 그림에서 회로의 등가가 성립되지 않는 것은?



①  $z = \overline{\overline{x + y}} = \overline{\overline{x} \cdot \overline{y}} = x + y$

②  $z = \overline{\overline{x} \cdot \overline{y}} = x + y$

③  $z = \overline{\overline{x + y}} = \overline{\overline{x} \cdot \overline{y}} = x + y$

④  $z = \overline{\overline{\overline{x + y} + \overline{x + y}}} = \overline{\overline{\overline{x + y}} \cdot \overline{\overline{x + y}}} = \overline{(\overline{x} + \overline{y})(x + y)} = \overline{\overline{x}y + x\overline{y}} = x \oplus y$

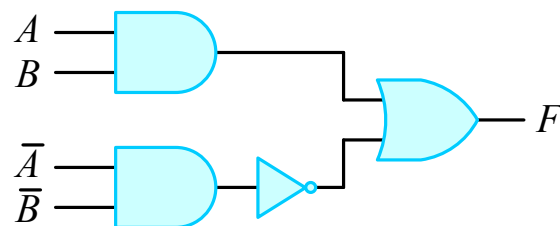
## 67. 다음과 같은 회로의 논리식은?

㉠  $AB$

㉡  $A + B$

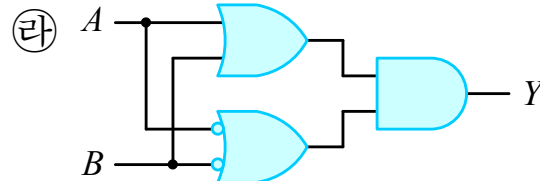
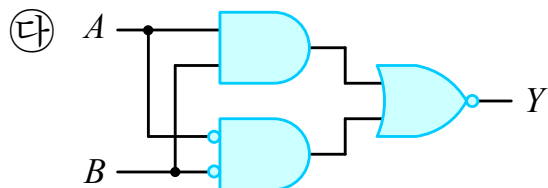
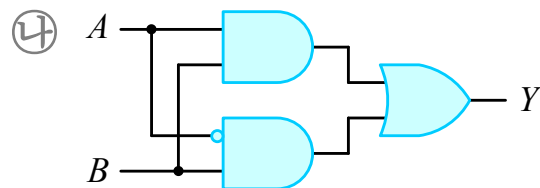
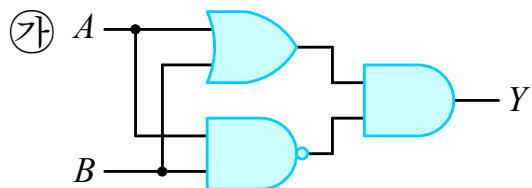
㉢  $\overline{A} + \overline{B}$

㉣  $\overline{A} \cdot \overline{B}$



$$F = AB + \overline{\overline{A}\overline{B}} = AB + A + B = A(1 + B) + B = A + B$$

## 68. 다음 논리회로 중 출력 $Y$ 가 논리적으로 같지 않은 것은?



㉠  $Y = (A + B)\overline{A}\overline{B} = (A + B)(\overline{A} + \overline{B}) = A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B$

㉡  $Y = AB + \overline{A}B = (A + \overline{A})B = B$

㉢  $Y = \overline{AB} + \overline{\overline{A}\overline{B}} = (\overline{A} + \overline{B})(A + B) = A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B$

㉣  $Y = (A + B)(\overline{A} + \overline{B}) = A\overline{A} + A\overline{B} + \overline{A}B + B\overline{B} = A\overline{B} + \overline{A}B$

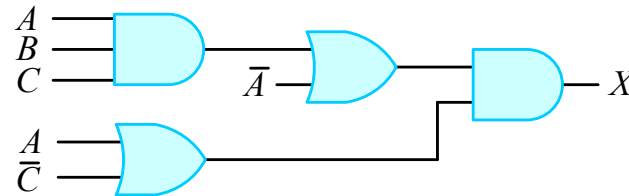
## 69. 다음과 같은 논리회로의 출력 $X$ 는?

㉠  $B + \bar{C}$

㉡  $ABC$

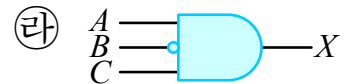
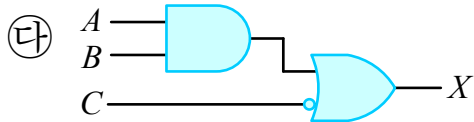
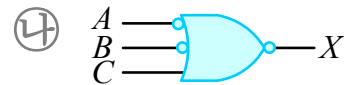
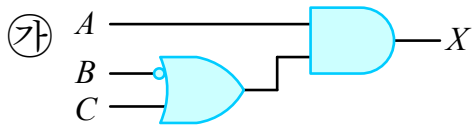
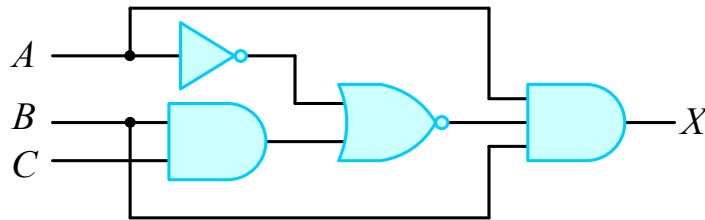
㉢  $AB + BC$

㉣  $ABC + \bar{A}\bar{C}$



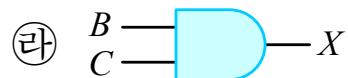
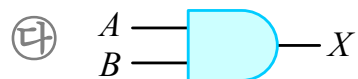
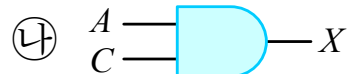
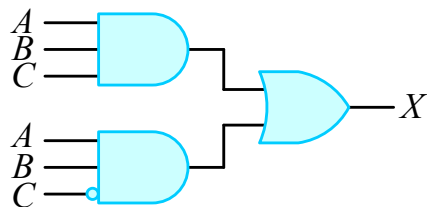
$$\begin{aligned}
 X &= (ABC + \bar{A})(A + \bar{C}) = ABCA + ABC\bar{C} + \bar{A}A + \bar{A}\bar{C} \\
 &= ABC + \bar{A}\bar{C}
 \end{aligned}$$

## 70. 다음과 같은 논리회로를 간소화한 회로는?



$$\begin{aligned}
 X &= \overline{BC} + \overline{A} \cdot A \cdot B = \overline{BC} \cdot A \cdot A \cdot B = (\overline{B} + \overline{C})AB = AB\overline{B} + AB\overline{C} = AB\overline{C} \\
 &= \overline{\overline{AB\overline{C}}} = \overline{\overline{A} + \overline{B} + C}
 \end{aligned}$$

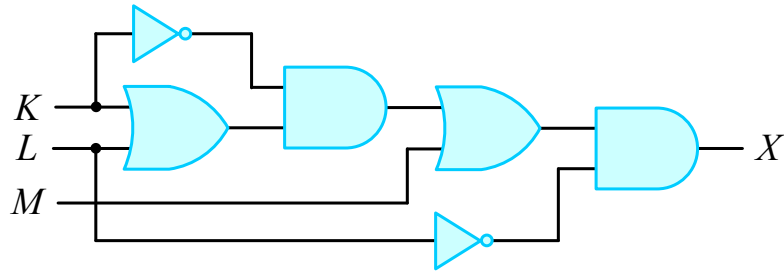
## 71. 다음 논리회로를 간단히 하면?



$$X = ABC + AB\bar{C} = AB(C + \bar{C}) = AB$$

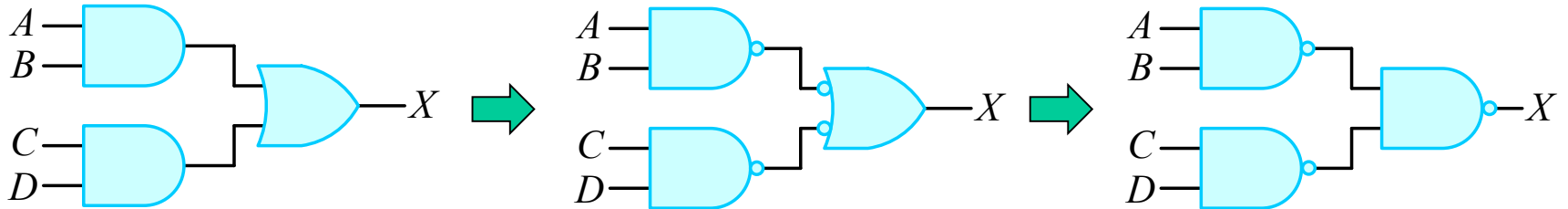
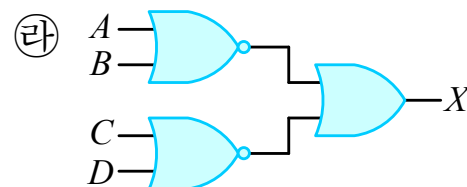
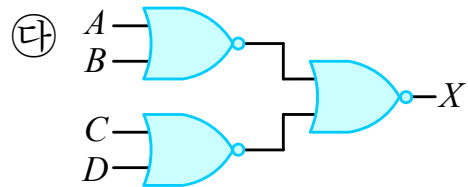
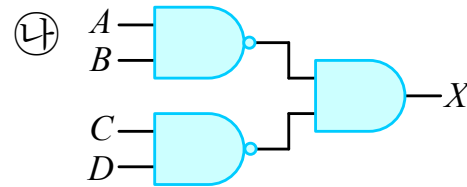
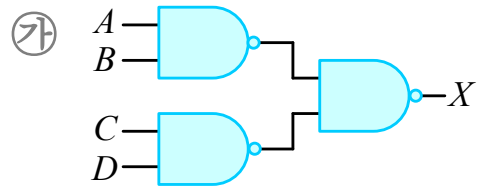
## 72. 다음 논리회로에서 출력 $X$ 의 논리식은?

- ㉠  $X = \bar{L}M$
- ㉡  $X = LK + \bar{K}M$
- ㉢  $X = M + \bar{L} + K$
- ㉣  $X = \bar{K}(K + L) + \bar{L}$

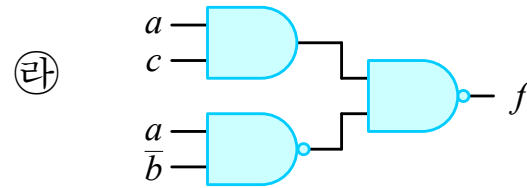
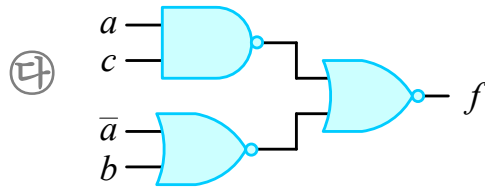
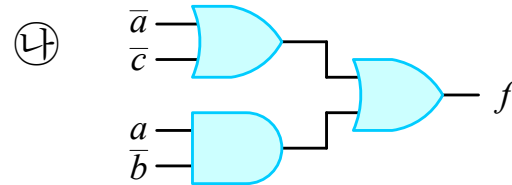
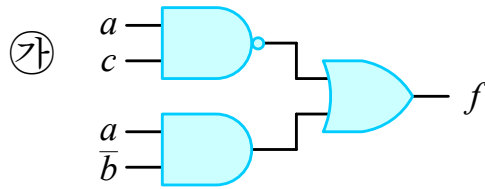


$$X = ((K + L)\bar{K} + M)\bar{L} = (K\bar{K} + L\bar{K} + M)\bar{L} = \bar{L}L\bar{K} + M\bar{L} = \bar{L}M$$

### 73. $X = AB + CD$ 를 논리회로로 표현하면?



## 74. $f = \overline{a}c + a\overline{b}$ 의 논리회로로 **잘못** 설계된 것은?



㉠  $f = \overline{a}c + a\overline{b}$

㉡  $f = \overline{a} + \overline{c} + a\overline{b} = \overline{a}c + a\overline{b}$

㉢  $f = \overline{\overline{a}c + a + b} = \overline{\overline{a}c} \cdot \overline{a + b} = ac(\overline{a} + \overline{b}) = ac\overline{a} + abc = abc$

㉣  $f = \overline{ac \cdot a\overline{b}} = \overline{ac} + \overline{a\overline{b}} = \overline{ac} + a\overline{b}$

75.  $A, B$  두 개의 변수로 구성된 논리함수의 최소항에 속하지 않는 것은?

㉠  $AB$

㉡  $\overline{A}\overline{B}$

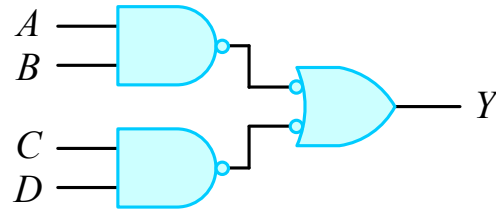
㉢  $\overline{A}B$

㉣  $A\overline{B}$

$A \ B$	최소항
0 0	$\overline{A}\overline{B}$
0 1	$\overline{A}B$
1 0	$A\overline{B}$
1 1	$AB$

## 76. 다음 논리회로의 구성은?

- ㉠ XOR 회로
- ㉡ XNOR 회로
- ㉢ OR-AND 회로
- ㉣ AND-OR 회로



$$Y = \overline{\overline{A}B} + \overline{\overline{C}D} = AB + CD$$

## 77. 다음 논리회로에 대한 진리표는?

㉠

$A$	$B$	$X$
0	0	0
0	1	1
1	0	1
1	1	1

㉡

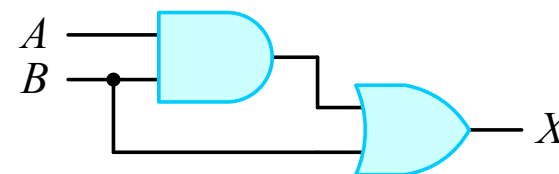
$A$	$B$	$X$
0	0	0
0	1	1
1	0	0
1	1	1

㉢

$A$	$B$	$X$
0	0	0
0	1	0
1	0	0
1	1	1

㉣

$A$	$B$	$X$
0	0	1
0	1	0
1	0	1
1	1	0



$$X = AB + B = B(A+1) = B$$

78. 논리함수  $f(a, b, c) = a\bar{b} + \bar{a} + b$ 의 부정을 구한 것은?

㉠  $a\bar{b}$

㉡  $\bar{a}+b$

㉢ 0

㉣ 1

$$\overline{f(a, b, c)} = \overline{a\bar{b} + \bar{a} + b} = \overline{a\bar{b}} \cdot \overline{\bar{a}} \cdot \overline{b} = (\bar{a} + b)a\bar{b} = \bar{a}ab + a\bar{b}b = 0$$

### 79. 논리함수 $F = \overline{A}B\overline{C} + \overline{A}\overline{B}C$ 를 complement화 한 것은?

㉠  $\overline{F} = (\overline{A} + B + \overline{C})(\overline{A} + \overline{B} + \overline{C})$

㉡  $\overline{F} = (A + \overline{B} + C)(A + B + C)$

㉢  $\overline{F} = (\overline{A} + B + C)(A + B + C)$

㉣  $\overline{F} = (A + \overline{B} + C)(\overline{A} + \overline{B} + \overline{C})$

$$\overline{F} = \overline{\overline{A}B\overline{C} + \overline{A}\overline{B}C} = \overline{\overline{A}B\overline{C}} \cdot \overline{\overline{A}\overline{B}C} = (A + \overline{B} + C)(A + B + C)$$

### 80. 논리식 $Y = \overline{A}B\overline{C} + A\overline{B}C + \overline{A}BC$ 의 부정식( $\overline{Y}$ )은?

㉠  $(A + \overline{B} + C)(\overline{A} + B + \overline{C})(A + \overline{B} + \overline{C})$

㉡  $(A + B + C)(\overline{A} + B + C)(A + \overline{B} + \overline{C})$

㉢  $(A + \overline{B} + C)(\overline{A} + \overline{B} + C)(A + \overline{B} + \overline{C})$

㉣  $(A + \overline{B} + C)(\overline{A} + \overline{B} + C)(\overline{A} + B + \overline{C})$

$$\overline{Y} = \overline{\overline{A}B\overline{C} + A\overline{B}C + \overline{A}BC} = (A + \overline{B} + C)(\overline{A} + B + \overline{C})(A + \overline{B} + \overline{C})$$

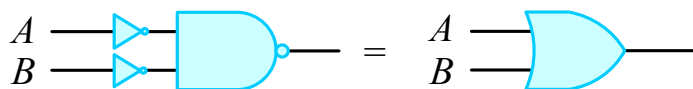
81. 2-input NAND gate input에 각각 inverter가 접속되어 있을 때 결과적으로 얻어지는 논리 작용은?

㉠ AND

㉡ OR

㉢ NAND

㉣ NOT



$$X = \overline{\overline{A} \cdot \overline{B}} = A + B$$

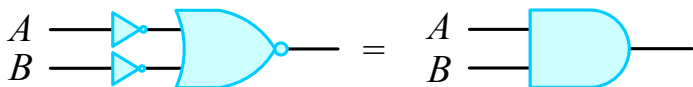
82. 2-input NOR 게이트 입력에 각각 inverter가 접속되어 있을 때 결과적으로 얻어지는 논리 작용은?

㉠ AND

㉡ OR

㉢ NAND

㉣ NOT



$$X = \overline{\overline{A} + \overline{B}} = A \cdot B$$

### 83. 불 함수 $F = A + \overline{B}C$ 를 최소항의 합으로 바르게 표시한 것은?

㉠  $F(A, B, C) = \sum m(1, 4, 5, 6, 7)$

㉡  $F(A, B, C) = \sum m(1, 2, 3, 6, 7)$

㉢  $F(A, B, C) = \sum m(1, 3, 5, 6, 7)$

㉣  $F(A, B, C) = \sum m(1, 2, 4, 6, 7)$

$$F = A + \overline{B}C$$

$$= A(B + \overline{B})(C + \overline{C}) + (A + \overline{A})\overline{B}C$$

$$= ABC + AB\overline{C} + A\overline{B}C + A\overline{B}\overline{C} + A\overline{B}C + \overline{A}\overline{B}C$$

$$= \overline{A}\overline{B}C + A\overline{B}\overline{C} + A\overline{B}C + AB\overline{C} + ABC$$

$$= m_1 + m_4 + m_5 + m_6 + m_7 = \sum m(1, 4, 5, 6, 7)$$

84. 논리함수  $f(x, y, z) = \sum m(1, 2, 3, 4)$ 를 최대항의 곱으로 표시하면?

㉠  $f(x, y, z) = \prod M(1, 3, 6, 7)$

㉡  $f(x, y, z) = \prod M(0, 5, 6, 7)$

㉢  $f(x, y, z) = \prod M(0, 2, 5, 6)$

㉣  $f(x, y, z) = \prod M(1, 3, 5, 7)$

$$\begin{aligned} f(x, y, z) &= \sum m(1, 2, 3, 4) \\ &= \overline{\prod M(1, 2, 3, 4)} \\ &= \prod M(0, 5, 6, 7) \end{aligned}$$