



◇ 「콘텐츠산업 진흥법 시행령」 제33조에 의한 표시

1) 제작연월일 : 2016-01-12

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3) 이 콘텐츠는 「콘텐츠산업 진흥법」에 따라 최초 제작일부터 5년간 보호됩니다.

◇ 「콘텐츠산업 진흥법」 외에도 「저작권법」에 의하여 보호되는 콘텐츠의 경우, 그 콘텐츠의 전부 또는 일부를 무단으로 복제하거나 전송하는 것은 콘텐츠산업 진흥법 외에도 저작권법에 의한 법적 책임을 질 수 있습니다.

계산시 참고사항

1. 공통인수로 묶어 인수분해하기

: 공통인수가 있으면 공통인수로 묶어내고 인수분해 공식을 이용하여 인수분해한다.

$$\text{예 } xy+x+y+1=x(y+1)+y+1=(x+1)(y+1)$$

2. 치환하여 인수분해하기

: 주어진 식에 공통부분이 있는 경우 공통부분을 한 문자로 치환하여 인수분해한다.

$$\text{예 } (2x-3)^2-8(2x-3)+16=A^2-8A+16=(A-4)^2=(2x-7)^2$$

3. A^2-B^2 꼴 이용하여 인수분해하기: 완전제곱식이 되는 3개의 항을 찾아 (3개의 항+1개의 항) 또는 (1개의 항+3개의 항)으로 묶어 A^2-B^2 꼴로 만들어 $(A+B)(A-B)$ 로 인수분해한다.

$$\text{예 } a^2+2ab+b^2-1=(a+b)^2-1^2=(a+b+1)(a+b-1)$$

4. () () () () + k 꼴 인수분해하기

(1) 공통부분이 나오도록 두 개씩 짝을 지어 전개한다.

(2) 공통부분을 치환하여 인수분해한다.

5. 내림차순으로 정리하여 인수분해하기

차수가 낮은 문자에 대하여 내림차순으로 정리한 후, 인수분해 공식을 사용한다.



항이 4개 이상인 복잡한 식 인수분해하기

■ 다음 식을 인수분해하여라.

1. $x^2+xy-8x-4y+16$

2. $x^2+2xy+x-4y-6$

3. $x^2+y^2+2xz+2yz+2xy$

4. $x^2+xy-x+2y-6$

5. $xy-x-4y+4$

6. a^3+a^2-a-1

7. $xy-xz-y+z$

8. $x^2+3x-3y-y^2$

9. $x^2+2x+1-y^2$

10. $a^2-4a+4-b^2$

11. $a^2 - 6a - b^2 + 9$

12. $x^3y + 4x^2y + 4xy$

13. $xy - x - y + 1$

14. $x^2 + 3x + 3y - y^2$

15. $x^3 - 3x^2 - x + 3$

16. $2x^2 - xy + 4xz - 2yz$

17. $xy + 2y + x + 2$

18. $xy + x - y - 1$

19. $x^2 - xy + y - x$

20. $x^2 - 4x + 4 - y^2$

21. $x^2 + y^2 - 4 + 2xy$

22. $x^2 - y^2 - 6y - 9$

23. $xy - 3x + y - 3$

24. $xy + 5x - 3y - 15$

25. $xy - xz + y - z$

26. $x^2 - y^2 - 2x + 2y$

27. $y^2 - x^2 + 8x - 16$

28. $4 - x^2 - y^2 + 2xy$

29. $x^2 - y^2 + z^2 - 2xz$

30. $x^2 + xy - 3x + y - 4$

31. $x^2 - xy + 5x - 2y + 6$

32. $x^2 - 8x + 15 + 2xy - 6y$

33. $2x^2 - 4x + 2 + xy - y$

34. $3x^2 - 5x + 2xy - 4y - 2$

35. $2x^2 - xy - x + y - y^2$

36. $x^2 - 2x + 1 + xy - y$

37. $x^2 + 6x + 9 + 2xy + 6y$

38. $x^2 - xy - x - 2y - 6$

39. $x^2 + 3xy - 6x - 3y + 5$

40. $x^2 + 2y^2 - 3xy - 3x + 6y$



치환하여 인수분해하기

▣ 다음 식을 인수분해하여라.

41. $x^2 + 2xy + y^2 - 2x - 2y + 1$

42. $x^2 - 3xy - 5x + 6y + 6$

43. $x^2 - 2xy - 4x + 2y + 3$

44. $x^2 + 3xy + 4x - 3y - 5$

45. $2x^2 + xy - 5x - 3y - 3$

46. $2x^2 - x + 2y - xy - 6$

47. $x^2 - 2xy + xz - yz + y^2$

48. $x^2 - 2xy + y^2 - 4$

49. $x^2 - 16 + 4y^2 - 4xy$

50. $36 - x^2 - y^2 + 2xy$

51. $16a^2 - b^2 + 8a + 1$

52. $a^2 - b^2 - 2bc - c^2$

53. $x^2 - y^2 - 6x + 9$

54. $9x^2(x+1) - 4x - 4$

55. $(x+y)^2 + 3(x+y) - 10$

56. $(x-4)^2 - 9$

57. $(2x-y)^2 - (x+5y)^2$

58. $(a+b)(a+b-2) - 8$

59. $(x-y)(x-y-5) - 14$

60. $(x-2)^2 - 2(x-2) + 1$

61. $(2x+3)^2 - (x+2)^2$

62. $(a-b)^2 - (a-b) - 2$

63. $(a+2b)^2 + 5(a+2b) + 6$

64. $(x+y)(x+y-6) + 9$

65. $(3x-4)^2 + 6(3x-4) + 9$

66. $(a+b)^2 - 14(a+b) + 49$

67. $(x-2y)^2 + 8(x-2y) + 16$

68. $(x-2y)^2 - (2x+3y)^2$

69. $(x+y)(x+y-3)+2$

70. $(2x+y)^2 + 2x+y-12$

71. $3(x+y)^2 + 10(x+y) + 8$

72. $(2x+1)^2 - 6(2x+1) + 8$

73. $(x-3y)^2 - 7(x-3y) + 12$

74. $2(x+y)(x+y+1) - 24$

75. $(3x-y)^2 + (3x-y)(x+4y)$

76. $(a-3)x^2 + 2(a-3)x - 24(a-3)$

77. $(x-1)x^2 - 16(x-1)$

78. $3(x+y)x^2 - 5xy(x+y) - 2y^2(x+y)$

79. $(3x-1)y^2 + 5(3x-1)y - 14(3x-1)$

80. $(x+1)^2 - 2(x+1) - 15$

81. $(3x+1)^2 - 2(3x+1) - 8$

82. $2(a-1)^2 + 3(a-1) - 2$

83. $6(x+2)^2 - 13(x+2) - 5$

84. $3(x+4y)^2 - 5(x+4y) - 2$

85. $4(a-b)^2 - 7(a-b) - 2$

86. $(a+b)(a+b-1) - 56$

87. $(x+y)(x+y-3) + 2$

88. $(x-5y)(x-5y+2) + 1$

89. $(2a-b)(2a-b-5) + 6$

90. $(3a-4b)(3a-4b-3) - 10$

91. $(7x+2y)(7x+2y-6) - 16$

92. $(2x+y)(2x+y-3) - 10$

93. $2(3x-1)^2 - 7(3x-1) + 5$

94. $x^2 + 4xy + 4y^2 + 1 + 2x + 4y$



() () () () + k 꼴 인수분해하기

▣ 다음 식을 인수분해하여라.

95. $(x-1)(x-3)(x+2)(x+4)+24$

96. $(a-1)(a-2)(a+3)(a+4)-6$

97. $(x-2)(x-3)(x-4)(x-5)+1$

98. $(x+1)(x+2)(x+3)(x+4)+1$

104. $x^2+2xy+y^2+3y+3x-4$

105. $x^2+y^2-2xy-x+y-2$

106. $x^2-y^2+6x+2y+8$

107. x^2-2x-y^2-4y-3

108. x^2+3x-y^2+y+2

109. $x^2-3y^2+x+2xy+7y-2$

110. x^2+4x-y^2+2y+3

111. $x^2-4xy+3y^2-6x+2y-16$

112. x^2-2x-y^2+2y



내림차순으로 정리하여 인수분해하기

▣ 다음 식을 인수분해하여라.

99. $x^2-y^2-x+5y-6$

100. $x^2-y^2+x+7y-12$

101. $x^2-5xy+6y^2+x-y-2$

102. $x^2-y^2+2x+8y-15$

103. $x^2-2y^2-xy-3x+2$

정답 및 해설



1) $(x-4)(x+y-4)$

⇒ (주어진 식)

$$= y(x-4) + (x^2 - 8x + 16) = y(x-4) + (x-4)^2 \\ = (x-4)(x+y-4)$$

2) $(x-2)(x+2y+3)$

⇒ (주어진 식)

$$= 2y(x-2) + (x^2 + x - 6) = 2y(x-2) + (x+3)(x-2) \\ = (x-2)(x+2y+3)$$

3) $(x+y)(x+y+2z)$

⇒ (주어진 식)

$$= 2z(x+y) + (x^2 + 2xy + y^2) = 2z(x+y) + (x+y)^2 \\ = (x+y)(x+y+2z)$$

4) $(x+2)(x+y-3)$

⇒ (주어진 식)

$$= y(x+2) + (x^2 - x - 6) = y(x+2) + (x-3)(x+2) \\ = (x+2)(x+y-3)$$

5) $(y-1)(x-4)$

⇒ (주어진 식) $= x(y-1) - 4(y-1) = (y-1)(x-4)$

6) $(a+1)^2(a-1)$

⇒ (주어진 식) $= a^2(a+1) - (a+1) = (a+1)(a^2-1)$
 $= (a+1)(a+1)(a-1) = (a+1)^2(a-1)$

7) $(y-z)(x-1)$

⇒ (주어진 식) $= x(y-z) - (y-z) = (y-z)(x-1)$

8) $(x-y)(x+y+3)$

⇒ (주어진 식)

$$= (x^2 - y^2) + (3x - 3y) = (x+y)(x-y) + 3(x-y) \\ = (x-y)(x+y+3)$$

9) $(x+y+1)(x-y+1)$

⇒ (주어진 식) $= (x+1)^2 - y^2 = (x+y+1)(x-y+1)$

10) $(a+b-2)(a-b-2)$

⇒ (주어진 식) $= (a-2)^2 - b^2 = (a+b-2)(a-b-2)$

11) $(a+b-3)(a-b-3)$

⇒ (주어진 식) $= (a-3)^2 - b^2 = (a+b-3)(a-b-3)$

12) $xy(x+2)^2$

⇒ $x^3y + 4x^2y + 4xy = xy(x^2 + 4x + 4) = xy(x+2)^2$

13) $(y-1)(x-1)$

⇒ $xy - x - y + 1 = x(y-1) - (y-1) = (y-1)(x-1)$

14) $(x+y)(x-y+3)$

$$⇒ x^2 + 3x + 3y - y^2 = x^2 - y^2 + 3x + 3y \\ = (x+y)(x-y) + 3(x+y) = (x+y)(x-y+3)$$

15) $(x-3)(x+1)(x-1)$

$$⇒ x^3 - 3x^2 - x + 3 = x^2(x-3) - (x-3) = (x-3)(x^2-1) \\ = (x-3)(x+1)(x-1)$$

16) $(x+2z)(2x-y)$

$$⇒ 2x^2 - xy + 4xz - 2yz = 2x(x+2z) - y(x+2z) \\ = (x+2z)(2x-y)$$

17) $(x+2)(y+1)$

⇒ $xy + 2y + x + 2 = y(x+2) + x + 2 = (x+2)(y+1)$

18) $(y+1)(x-1)$

⇒ $xy + x - y - 1 = x(y+1) - (y+1) = (y+1)(x-1)$

19) $(x-y)(x-1)$

⇒ $x^2 - xy + y - x = x(x-y) - (x-y) = (x-y)(x-1)$

20) $(x+y-2)(x-y-2)$

$$⇒ x^2 - 4x + 4 - y^2 = (x-2)^2 - y^2 = (x-2+y)(x-2-y) \\ = (x+y-2)(x-y-2)$$

21) $(x+y+2)(x+y-2)$

$$⇒ x^2 + y^2 - 4 + 2xy = (x+y)^2 - 2^2 \\ = (x+y+2)(x+y-2)$$

22) $(x+y+3)(x-y-3)$

⇒ $x^2 - y^2 - 6y - 9 = x^2 - (y+3)^2 = (x+y+3)(x-y-3)$

23) $(y-3)(x+1)$

⇒ $xy - 3x + y - 3 = x(y-3) + y - 3 = (y-3)(x+1)$

24) $(y+5)(x-3)$

$$⇒ xy + 5x - 3y - 15 = x(y+5) - 3(y+5) \\ = (y+5)(x-3)$$

25) $(y-z)(x+1)$

⇒ $xy - xz + y - z = x(y-z) + y - z = (y-z)(x+1)$

26) $(x-y)(x+y-2)$

$$⇒ x^2 - y^2 - 2x + 2y = (x+y)(x-y) - 2(x-y) \\ = (x-y)(x+y-2)$$

27) $(y+x-4)(y-x+4)$

$$⇒ y^2 - x^2 + 8x - 16 = y^2 - (x-4)^2 \\ = \{y + (x-4)\}\{y - (x-4)\} = (y+x-4)(y-x+4)$$

28) $(2+x-y)(2-x+y)$

⇒ $4 - x^2 - y^2 + 2xy = 4 - (x-y)^2$

$$= \{2 + (x - y)\} \{2 - (x - y)\} = (2 + x - y)(2 - x + y)$$

$$29) (x - z + y)(x - z - y)$$

$$\begin{aligned} \Rightarrow x^2 - y^2 + z^2 - 2xz &= x^2 - 2xz + z^2 - y^2 = (x - z)^2 - y^2 \\ &= (x - z + y)(x - z - y) \end{aligned}$$

$$30) (x + 1)(x + y - 4)$$

$$\begin{aligned} \Rightarrow x^2 + xy - 3x + y - 4 &= x^2 - 3x - 4 + xy + y \\ &= (x - 4)(x + 1) + y(x + 1) = (x + 1)(x + y - 4) \end{aligned}$$

$$31) (x + 2)(x - y + 3)$$

$$\begin{aligned} \Rightarrow x^2 - xy + 5x - 2y + 6 &= x^2 + 5x + 6 - xy - 2y \\ &= (x + 2)(x + 3) - y(x + 2) = (x + 2)(x - y + 3) \end{aligned}$$

$$32) (x - 3)(x + 2y - 5)$$

$$\begin{aligned} \Rightarrow x^2 - 8x + 15 + 2xy - 6y &= (x - 3)(x - 5) + 2y(x - 3) \\ &= (x - 3)(x + 2y - 5) \end{aligned}$$

$$33) (x - 1)(2x + y - 2)$$

$$\begin{aligned} \Rightarrow 2x^2 - 4x + 2 + xy - y &= 2(x - 1)^2 + y(x - 1) \\ &= (x - 1)(2x + y - 2) \end{aligned}$$

$$34) (x - 2)(3x + 2y + 1)$$

$$\begin{aligned} \Rightarrow 3x^2 - 5x + 2xy - 4y - 2 &= 3x^2 - 5x - 2 + 2xy - 4y \\ &= (x - 2)(3x + 1) + 2y(x - 2) = (x - 2)(3x + 2y + 1) \end{aligned}$$

$$35) (x - y)(2x + y - 1)$$

$$\begin{aligned} \Rightarrow 2x^2 - xy - x + y - y^2 &= 2x^2 - xy - y^2 - x + y \\ &= (x - y)(2x + y) - (x - y) = (x - y)(2x + y - 1) \end{aligned}$$

$$36) (x - 1)(x + y - 1)$$

$$\begin{aligned} \Rightarrow x^2 - 2x + 1 + xy - y &= (x - 1)^2 + y(x - 1) \\ &= (x - 1)(x + y - 1) \end{aligned}$$

$$37) (x + 3)(x + 2y + 3)$$

$$\begin{aligned} \Rightarrow x^2 + 6x + 9 + 2xy + 6y &= (x + 3)^2 + 2y(x + 3) \\ &= (x + 3)(x + 2y + 3) \end{aligned}$$

$$38) (x + 2)(x - y - 3)$$

$$\begin{aligned} \Rightarrow x^2 - xy - x - 2y - 6 &= (x^2 - x - 6) - y(x + 2) \\ &= (x - 3)(x + 2) - y(x + 2) = (x + 2)(x - y - 3) \end{aligned}$$

$$39) (x - 1)(x + 3y - 5)$$

$$\begin{aligned} \Rightarrow x^2 + 3xy - 6x - 3y + 5 &= (x^2 - 6x + 5) + 3y(x - 1) \\ &= (x - 1)(x - 5) + 3y(x - 1) = (x - 1)(x + 3y - 5) \end{aligned}$$

$$40) (x - 2y)(x - y - 3)$$

$$\begin{aligned} \Rightarrow x^2 + 2y^2 - 3xy - 3x + 6y &= (x^2 - 3xy + 2y^2) - 3(x - 2y) \\ &= (x - y)(x - 2y) - 3(x - 2y) = (x - 2y)(x - y - 3) \end{aligned}$$

$$41) (x + y - 1)^2$$

$$\begin{aligned} \Rightarrow x^2 + 2xy + y^2 - 2x - 2y + 1 &= (x + y)^2 - 2(x + y) + 1 \\ &= (x + y - 1)^2 \end{aligned}$$

$$42) (x - 2)(x - 3y - 3)$$

$$\begin{aligned} \Rightarrow x^2 - 3xy - 5x + 6y + 6 &= x^2 - 5x + 6 - 3xy + 6y \\ &= (x - 2)(x - 3) - 3y(x - 2) = (x - 2)(x - 3y - 3) \end{aligned}$$

$$43) (x - 1)(x - 2y - 3)$$

$$\begin{aligned} \Rightarrow x^2 - 2xy - 4x + 2y + 3 &= x^2 - 4x + 3 - 2xy + 2y \\ &= (x - 1)(x - 3) - 2y(x - 1) = (x - 1)(x - 2y - 3) \end{aligned}$$

$$44) (x - 1)(x + 3y + 5)$$

$$\begin{aligned} \Rightarrow x^2 + 3xy + 4x - 3y - 5 &= x^2 + 4x - 5 + 3xy - 3y \\ &= (x + 5)(x - 1) + 3y(x - 1) = (x - 1)(x + 3y + 5) \end{aligned}$$

$$45) (x - 3)(2x + y + 1)$$

$$\begin{aligned} \Rightarrow 2x^2 + xy - 5x - 3y - 3 &= y(x - 3) + 2x^2 - 5x - 3 \\ &= y(x - 3) + (2x + 1)(x - 3) \\ &= (x - 3)(2x + y + 1) \end{aligned}$$

$$46) (x - 2)(2x - y + 3)$$

$$\begin{aligned} \Rightarrow 2x^2 - x + 2y - xy - 6 &= y(2 - x) + 2x^2 - x - 6 \\ &= y(2 - x) + (2x + 3)(x - 2) \\ &= (x - 2)(2x - y + 3) \end{aligned}$$

$$47) (x - y)(x - y + z)$$

$$\begin{aligned} \Rightarrow x^2 - 2xy + xz - yz + y^2 &= z(x - y) + x^2 - 2xy + y^2 \\ &= z(x - y) + (x - y)^2 \\ &= (x - y)(x - y + z) \end{aligned}$$

$$48) (x - y + 2)(x - y - 2)$$

$$\begin{aligned} \Rightarrow x^2 - 2xy + y^2 - 4 &= (x - y)^2 - 2^2 \\ &= (x - y + 2)(x - y - 2) \end{aligned}$$

$$49) (x - 2y + 4)(x - 2y - 4)$$

$$\begin{aligned} \Rightarrow x^2 - 16 + 4y^2 - 4xy &= x^2 - 4xy + 4y^2 - 16 \\ &= (x - 2y)^2 - 4^2 \\ &= (x - 2y + 4)(x - 2y - 4) \end{aligned}$$

$$50) (6 + x - y)(6 - x + y)$$

$$\begin{aligned} \Rightarrow 36 - x^2 - y^2 + 2xy &= 36 - (x^2 - 2xy + y^2) \\ &= 6^2 - (x - y)^2 \\ &= (6 + x - y)(6 - x + y) \end{aligned}$$

$$51) (4a + b + 1)(4a - b + 1)$$

$$\begin{aligned} \Rightarrow 16a^2 - b^2 + 8a + 1 &= 16a^2 + 8a + 1 - b^2 \\ &= (4a + 1)^2 - b^2 \\ &= (4a + b + 1)(4a - b + 1) \end{aligned}$$

$$52) (a + b + c)(a - b - c)$$

$$\begin{aligned} \Rightarrow a^2 - b^2 - 2bc - c^2 &= a^2 - (b^2 + 2bc + c^2) \\ &= a^2 - (b + c)^2 \\ &= (a + b + c)(a - b - c) \end{aligned}$$

$$53) (x + y - 3)(x - y - 3)$$

$$\begin{aligned}\Rightarrow x^2 - y^2 - 6x + 9 &= x^2 - 6x + 9 - y^2 \\ &= (x-3)^2 - y^2 \\ &= (x+y-3)(x-y-3)\end{aligned}$$

$$\begin{aligned}54) (x+1)(3x+2)(3x-2) \\ \Rightarrow 9x^2(x+1) - 4x - 4 &= 9x^2(x+1) - 4(x+1) \\ &= (x+1)(9x^2-4) = (x+1)(3x+2)(3x-2)\end{aligned}$$

$$\begin{aligned}55) (x+y+5)(x+y-2) \\ \Rightarrow x+y = A \text{로 치환하면} \\ A^2 + 3A - 10 &= (A+5)(A-2) = (x+y+5)(x+y-2)\end{aligned}$$

$$\begin{aligned}56) (x-1)(x-7) \\ \Rightarrow x-4 = A \text{로 치환하면} \\ A^2 - 9 &= (A+3)(A-3) \\ &= (x-4+3)(x-4-3) = (x-1)(x-7)\end{aligned}$$

$$\begin{aligned}57) (3x+4y)(x-6y) \\ \Rightarrow 2x-y = A, \quad x+5y = B \text{로 치환하면} \\ A^2 - B^2 &= (A+B)(A-B) \\ &= (2x-y+x+5y)(2x-y-x-5y) = (3x+4y)(x-6y)\end{aligned}$$

$$\begin{aligned}58) (a+b-4)(a+b+2) \\ \Rightarrow a+b = A \text{로 치환하면} \\ A(A-2) - 8 &= A^2 - 2A - 8 = (A-4)(A+2) \\ &= (a+b-4)(a+b+2)\end{aligned}$$

$$59) (x-y-7)(x-y+2)$$

$$\begin{aligned}60) (x-3)^2 \\ \Rightarrow x-2 = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - 2A + 1 = (A-1)^2 \\ &= (x-2-1)^2 = (x-3)^2\end{aligned}$$

$$\begin{aligned}61) (3x+5)(x+1) \\ \Rightarrow 2x+3 = A, \quad x+2 = B \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - B^2 = (A+B)(A-B) \\ &= \{(2x+3) + (x+2)\} \{(2x+3) - (x+2)\} \\ &= (3x+5)(x+1)\end{aligned}$$

$$\begin{aligned}62) (a-b+1)(a-b-2) \\ \Rightarrow a-b = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - A - 2 = (A+1)(A-2) \\ &= (a-b+1)(a-b-2)\end{aligned}$$

$$\begin{aligned}63) (a+2b+2)(a+2b+3) \\ \Rightarrow a+2b = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 + 5A + 6 = (A+2)(A+3) \\ &= (a+2b+2)(a+2b+3)\end{aligned}$$

$$\begin{aligned}64) (x+y-3)^2 \\ \Rightarrow x+y = A \text{로 치환하면} \\ (\text{주어진 식}) &= A(A-6) + 9 = A^2 - 6A + 9 = (A-3)^2\end{aligned}$$

$$= (x+y-3)^2$$

$$\begin{aligned}65) (3x-1)^2 \\ \Rightarrow 3x-4 = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 + 6A + 9 = (A+3)^2 \\ &= (3x-4+3)^2 = (3x-1)^2\end{aligned}$$

$$\begin{aligned}66) (a+b-7)^2 \\ \Rightarrow a+b = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - 14A + 49 = (A-7)^2 = (a+b-7)^2\end{aligned}$$

$$\begin{aligned}67) (x-2y+4)^2 \\ \Rightarrow x-2y = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 + 8A + 16 = (A+4)^2 = (x-2y+4)^2\end{aligned}$$

$$\begin{aligned}68) -(3x+y)(x+5y) \\ \Rightarrow x-2y = A, \quad 2x+3y = B \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - B^2 = (A+B)(A-B) \\ &= \{(x-2y) + (2x+3y)\} \{(x-2y) - (2x+3y)\} \\ &= (3x+y)(-x-5y) \\ &= -(3x+y)(x+5y)\end{aligned}$$

$$\begin{aligned}69) (x+y-1)(x+y-2) \\ \Rightarrow x+y = A \text{로 치환하면} \\ (\text{주어진 식}) &= A(A-3) + 2 = A^2 - 3A + 2 \\ &= (A-1)(A-2) = (x+y-1)(x+y-2)\end{aligned}$$

$$\begin{aligned}70) (2x+y-3)(2x+y+4) \\ \Rightarrow 2x+y = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 + A - 12 = (A-3)(A+4) \\ &= (2x+y-3)(2x+y+4)\end{aligned}$$

$$\begin{aligned}71) (x+y+2)(3x+3y+4) \\ \Rightarrow x+y = A \text{로 치환하면} \\ (\text{주어진 식}) &= 3A^2 + 10A + 8 = (A+2)(3A+4) \\ &= (x+y+2)\{3(x+y)+4\} = (x+y+2)(3x+3y+4)\end{aligned}$$

$$\begin{aligned}72) (2x-1)(2x-3) \\ \Rightarrow 2x+1 = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - 6A + 8 = (A-2)(A-4) \\ &= (2x+1-2)(2x+1-4) = (2x-1)(2x-3)\end{aligned}$$

$$\begin{aligned}73) (x-3y-3)(x-3y-4) \\ \Rightarrow x-3y = A \text{로 치환하면} \\ (\text{주어진 식}) &= A^2 - 7A + 12 = (A-3)(A-4) \\ &= (x-3y-3)(x-3y-4)\end{aligned}$$

$$\begin{aligned}74) 2(x+y-3)(x+y+4) \\ \Rightarrow x+y = A \text{로 치환하면} \\ (\text{주어진 식}) &= 2A(A+1) - 24 = 2A^2 + 2A - 24 \\ &= 2(A^2 + A - 12) = 2(A-3)(A+4) \\ &= 2(x+y-3)(x+y+4)\end{aligned}$$

75) $(3x-y)(4x+3y)$

$$\Rightarrow (3x-y)^2 + (3x-y)(x+4y) \\ = (3x-y)(3x-y+x+4y) = (3x-y)(4x+3y)$$

76) $(a-3)(x-4)(x+6)$

$$\Rightarrow (a-3)x^2 + 2(a-3)x - 24(a-3) \\ = (a-3)(x^2 + 2x - 24) = (a-3)(x-4)(x+6)$$

77) $(x-1)(x+4)(x-4)$

$$\Rightarrow (x-1)x^2 - 16(x-1) = (x-1)(x^2 - 16) \\ = (x-1)(x+4)(x-4)$$

78) $(x+y)(x-2y)(3x+y)$

$$\Rightarrow 3(x+y)x^2 - 5xy(x+y) - 2y^2(x+y) \\ = (x+y)(3x^2 - 5xy - 2y^2) \\ = (x+y)(x-2y)(3x+y)$$

79) $(3x-1)(y+7)(y-2)$

$$\Rightarrow (3x-1)y^2 + 5(3x-1)y - 14(3x-1) \\ = (3x-1)(y^2 + 5y - 14) \\ = (3x-1)(y+7)(y-2)$$

80) $(x-4)(x+4)$

$$\Rightarrow x+1=A \text{로 치환하면} \\ (x+1)^2 - 2(x+1) - 15 \\ = A^2 - 2A - 15 = (A-5)(A+3) \\ = (x+1-5)(x+1+3) = (x-4)(x+4)$$

81) $9(x-1)(x+1)$

$$\Rightarrow 3x+1=A \text{로 치환하면} \\ (3x+1)^2 - 2(3x+1) - 8 \\ = A^2 - 2A - 8 = (A-4)(A+2) \\ = (3x+1-4)(3x+1+2) \\ = (3x-3)(3x+3) = 9(x-1)(x+1)$$

82) $(2a-3)(a+1)$

$$\Rightarrow a-1=A \text{로 치환하면} \\ 2(a-1)^2 + 3(a-1) - 2 \\ = 2A^2 + 3A - 2 = (2A-1)(A+2) \\ = \{2(a-1)-1\}(a-1+2) \\ = (2a-3)(a+1)$$

83) $(2x-1)(3x+7)$

$$\Rightarrow x+2=A \text{로 치환하면} \\ 6(x+2)^2 - 13(x+2) - 5 \\ = 6A^2 - 13A - 5 = (2A-5)(3A+1) \\ = \{2(x+2)-5\}\{3(x+2)+1\} \\ = (2x-1)(3x+7)$$

84) $(3x+12y+1)(x+4y-2)$

$$\Rightarrow x+4y=A \text{로 치환하면}$$

$$3(x+4y)^2 - 5(x+4y) - 2 \\ = 3A^2 - 5A - 2 \\ = (3A+1)(A-2) \\ = \{3(x+4y)+1\}(x+4y-2) \\ = (3x+12y+1)(x+4y-2)$$

85) $(4a-4b+1)(a-b-2)$

$$\Rightarrow a-b=A \text{로 치환하면} \\ 4(a-b)^2 - 7(a-b) - 2 \\ = 4A^2 - 7A - 2 = (4A+1)(A-2) \\ = \{4(a-b)+1\}(a-b-2) \\ = (4a-4b+1)(a-b-2)$$

86) $(a+b-8)(a+b+7)$

$$\Rightarrow a+b=A \text{로 치환하면} \\ (a+b)(a+b-1) - 56 = A(A-1) - 56 \\ = A^2 - A - 56 \\ = (A-8)(A+7) \\ = (a+b-8)(a+b+7)$$

87) $(x+y-2)(x+y-1)$

$$\Rightarrow x+y=A \text{로 치환하면} \\ (x+y)(x+y-3) + 2 = A(A-3) + 2 \\ = A^2 - 3A + 2 \\ = (A-2)(A-1) \\ = (x+y-2)(x+y-1)$$

88) $(x-5y+1)^2$

$$\Rightarrow x-5y=A \text{로 치환하면} \\ (x-5y)(x-5y+2) + 1 = A(A+2) + 1 \\ = A(A+2) + 1 \\ = A^2 + 2A + 1 \\ = (A+1)^2 \\ = (x-5y+1)^2$$

89) $(2a-b-3)(2a-b-2)$

$$\Rightarrow 2a-b=A \text{로 치환하면} \\ (2a-b)(2a-b-5) + 6 \\ = A(A-5) + 6 \\ = A^2 - 5A + 6 \\ = (A-3)(A-2) \\ = (2a-b-3)(2a-b-2)$$

90) $(3a-4b-5)(3a-4b+2)$

$$\Rightarrow 3a-4b=A \text{로 치환하면} \\ (3a-4b)(3a-4b-3) - 10 \\ = A(A-3) - 10 \\ = A^2 - 3A - 10 \\ = (A-5)(A+2) \\ = (3a-4b-5)(3a-4b+2)$$

91) $(7x+2y-8)(7x+2y+2)$

$$\Rightarrow 7x+2y=A \text{로 치환하면} \\ (7x+2y)(7x+2y-6) - 16 \\ = A(A-6) - 16 \\ = A^2 - 6A - 16 \\ = (A-8)(A+2) \\ = (7x+2y-8)(7x+2y+2)$$

92) $(2x+y-5)(2x+y+2)$

$\Rightarrow 2x+y=A$ 라 할 때,

$$A(A-3)-10=A^2-3A-10=(A-5)(A+2)$$

$$=(2x+y-5)(2x+y+2)$$

93) $(3x-2)(6x-7)$

$\Rightarrow 3x-1=A$ 라 하면

$$2A^2-7A+5=(2A-5)(A-1)=(6x-7)(3x-2)$$

94) $(x+2y+1)^2$

$\Rightarrow x+2y=A$ 로 치환하면

$$x^2+4xy+4y^2+1+2x+4y=(x+2y)^2+2(x+2y)+1$$

$$=A^2+2A+1=(A+1)^2$$

$$=(x+2y+1)^2$$

95) $(x^2+x-8)(x+3)(x-2)$

96) $(a^2+2a-2)(a^2+2a-9)$

97) $(x^2-7x+11)^2$

$$\Rightarrow (x-2)(x-3)(x-4)(x-5)+1$$

$$=(x-2)(x-5)(x-3)(x-4)+1$$

$$=(x^2-7x+10)(x^2-7x+12)+1$$

$$=(A+10)(A+12)+1$$

$$=A^2+22A+120+1$$

$$=(A+11)^2$$

$$=(x^2-7x+11)^2$$

98) $(x^2+5x+5)^2$

$$\Rightarrow (x+1)(x+2)(x+3)(x+4)+1$$

$$=(x+1)(x+4)(x+2)(x+3)+1$$

$$=(x^2+5x+4)(x^2+5x+6)+1$$

$$=(A+4)(A+6)+1=A^2+10A+24+1$$

$$=(A+5)^2$$

$$=(x^2+5x+5)^2$$

99) $(x+y-3)(x-y+2)$

$$\Rightarrow x^2-y^2-x+5y-6=x^2-x-(y^2-5y+6)$$

$$=x^2-x-(y-3)(y-2)$$

$$=(x+y-3)(x-y+2)$$

100) $(x+y-3)(x-y+4)$

$$\Rightarrow x^2-y^2+x+7y-12=x^2+x-(y^2-7y+12)$$

$$=x^2+x-(y-3)(y-4)=(x+y-3)(x-y+4)$$

101) $(x-2y-1)(x-3y+2)$

$$\Rightarrow (\text{주어진 식})=x^2+(-5y+1)x+(6y^2-y-2)$$

$$=x^2+(-5y+1)x+(2y+1)(3y-2)$$

$$=(x-2y-1)(x-3y+2)$$

102) $(x-y+4)(x+y-3)$

$$\Rightarrow x^2-y^2+2x+8y-15=x^2+2x-(y^2-8y+15)$$

$$=x^2+2x-(y-5)(y-3)$$

$$=(x-y+5)(x+y-3)$$

103) $(x+y-1)(x-2y-2)$

$$\Rightarrow x^2-2y^2-xy-3x+2$$

$$=x^2-(y+3)x-2y^2+2$$

$$=x^2-(y+3)x-2(y-1)(y+1)$$

$$=(x+y-1)(x-2y-2)$$

104) $(x+y+4)(x+y-1)$

$$\Rightarrow (\text{주어진 식})=x^2+(2y+3)x+(y^2+3y-4)$$

$$=x^2+(2y+3)x+(y+4)(y-1)$$

$$=(x+y+4)(x+y-1)$$

105) $(x-y-2)(x-y+1)$

$$\Rightarrow x^2+y^2-2xy-x+y-2$$

$$=x^2-(2y+1)x+(y^2+y-2)$$

$$=x^2-(2y+1)x+(y+2)(y-1)$$

$$=(x-y-2)(x-y+1)$$

106) $(x+y+2)(x-y+4)$

$$\Rightarrow x^2-y^2+6x+2y+8$$

$$=x^2+6x-(y^2-2y-8)$$

$$=x^2+6x-(y+2)(y-4)$$

$$=(x+y+2)(x-y+4)$$

107) $(x+y+1)(x-y-3)$

$$\Rightarrow x^2-2x-y^2-4y-3$$

$$=x^2-2x-(y^2+4y+3)$$

$$=x^2-2x-(y+1)(y+3)$$

$$=(x+y+1)(x-y-3)$$

108) $(x-y+2)(x+y+1)$

$$\Rightarrow x^2+3x-y^2+y+2$$

$$=x^2+3x-(y^2-y-2)$$

$$=x^2+3x-(y+1)(y-2)$$

$$=(x-y+2)(x+y+1)$$

109) $(x+3y-1)(x-y+2)$

$$\Rightarrow x^2-3y^2+x+2xy+7y-2$$

$$=x^2+(2y+1)x-(3y^2-7y+2)$$

$$=x^2+(2y+1)x-(3y-1)(y-2)$$

$$=(x+3y-1)(x-y+2)$$

110) $(x+y+1)(x-y+3)$

$$\Rightarrow x^2+4x-y^2+2y+3$$

$$=x^2+4x-(y^2-2y-3)$$

$$=x^2+4x-(y+1)(y-3)$$

$$=(x+y+1)(x-y+3)$$

111) $(x-3y-8)(x-y+2)$

$$\begin{aligned}
 \Rightarrow & x^2 - 4xy + 3y^2 - 6x + 2y - 16 \\
 &= x^2 - (4y+6)x + (3y^2+2y-16) \\
 &= x^2 - (4y+6)x + (3y+8)(y-2) \\
 &= (x-3y-8)(x-y+2)
 \end{aligned}$$

$$112) (x-y)(x+y-2)$$

$$\begin{aligned}
 \Rightarrow & x^2 - 2x - y^2 + 2y \\
 &= x^2 - 2x - (y^2 - 2y) \\
 &= x^2 - 2x - y(y-2) \\
 &= (x-y)(x+y-2)
 \end{aligned}$$