



계산력 연습

중 3 과정

[영역] 2.문자와 식

2-2-2.인수분해 공식을 이용하여 수 계산하기, 식의 값 구하기



◇ 「콘텐츠산업 진흥법 시행령」 제33조에 의한 표시

1) 제작연월일 : 2016-01-12

2) 제작자 : 교육지대(주)

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. 인수분해 공식을 이용하여 수 계산하기

: 복잡한 수의 계산은 인수분해 공식을 사용할 수 있도록 수의 모양을 변형하면 쉽게 계산할 수 있다.

$$\text{예 } 101^2 - 1 = 101^2 - 1^2 = (101+1)(101-1) = 102 \times 100 = 10200$$

$$97^2 + 6 \times 97 + 3^2 = 97^2 + 2 \times 97 \times 3 + 3^2 = (97+3)^2 = 100^2 = 10000$$

2. 인수분해 공식을 이용하여 식의 값 구하기

: 복잡한 식을 인수분해한 후, 문자의 값을 대입하여 식의 값을 구한다.



수 계산하기

■ 인수분해 공식을 이용하여 다음을 계산하여라.

1. $75 \times 65 + 75 \times 35$

2. $15 \times 125 - 15 \times 25$

3. $101^2 - 99^2$

4. $\sqrt{52^2 - 48^2}$

5. $102 - 4 \times 102 + 4$

6. $1^2 - 2^2 + 3^2 - 4^2$

7. $9 \times 67 + 9 \times 33$

8. $11 \times 26 + 11 \times 24$

9. $19 \times 77 - 19 \times 57$

10. $45 \times 98 - 45 \times 96$

11. $25 \times 8.5 + 25 \times 1.5$

12. $125 \times 3.4 - 125 \times 1.4$

13. $102^2 - 98^2$

14. $175^2 - 25^2$

15. $98^2 - 4$

16. $5.5^2 - 4.5^2$

17. $\sqrt{26^2 - 24^2}$

18. $\sqrt{41^2 - 40^2}$

19. $12^2 \times 5 - 8^2 \times 5$

20. $2.5 \times 16.5^2 - 2.5 \times 3.5^2$

21. $95^2 + 2 \times 95 \times 5 + 5^2$

22. $36^2 + 2 \times 36 \times 4 + 16$

23. $57^2 + 6 \times 57 + 3^2$

24. $73^2 - 6 \times 73 + 9$

25. $31^2 - 2 \times 31 + 1$

26. $57^2 - 86 \times 57 + 43^2$

27. $104^2 - 8 \times 104 + 16$

28. $24.5^2 - 9 \times 24.5 + 4.5^2$

29. $55^2 \times 3.14 - 45^2 \times 3.14$

30. $22^2 + 25 \times 31 + 25 \times 9 - 28^2$

31. $2 \times 7.75^2 - 2 \times 2.25^2$

32. $5 \times 6.5^2 - 5 \times 3.5^2$

33. $5.5^2 \times 11.5 - 4.5^2 \times 11.5$

34. $56^2 \times \frac{3}{100} - 44^2 \times \frac{3}{100}$

35. $(6.5)^2 - 5 \times 6.5 \times 2.5 + 6 \times (2.5)^2$

36. $3 \times 3.5^2 - 3 \times 1.5^2 + 2 \times 3^2 - 2 \times 4^2$

37. $27.6^2 \times \frac{1}{5} - 22.4^2 \times \frac{1}{5}$

38. $51^2 \times \frac{3}{5} - 49^2 \times \frac{3}{5}$

39. $9 \times 3.5^2 - 9 \times 1.5^2$

40. $98^2 - 2 \times 98 - 8$

41. $\frac{200^2 - 1}{201} \times 99 + 199$

42. $\frac{65^2 + 2 \times 65 \times 35 + 35^2}{65^2 - 35^2}$

43. $\frac{2009^2 - 1}{2009 \times 2010 + 2009 + 1}$

44. $\frac{994^2 + 8 \times 994 + 12}{998^2 - 2^2}$

45. $\frac{(99.5)^2 + 99.5 + 0.25}{(200.5)^2 - 200.5 + 0.25}$

46. $1^2 - 4^2 + 7^2 - 10^2 + 13^2 - 16^2$

47. $17^2 - 15^2 + 13^2 - 11^2 + 9^2 - 7^2 + 5^2 - 3^2 + 1^2$

48. $103^2 - 97^2 + 54^2 - 46^2 + 16^2 - 4^2$

49. $12^2 - 11^2 + 10^2 - 9^2 + 8^2 - 7^2$

50. $2^2 - 4^2 + 6^2 - 8^2 + 10^2 - 12^2 + 14^2 - 16^2 + 18^2 - 20^2$



식의 값 구하기

■ 인수분해 공식을 이용하여 다음을 구하여라.

51. $x = 98$ 일 때, $x^2 + 4x + 4$ 의 값

52. $x = 103$ 일 때, $x^2 - 6x + 9$ 의 값

53. $x = 1 + \sqrt{3}$ 일 때, $x^2 - 2x + 1$ 의 값

54. $x = -4 + \sqrt{2}$ 일 때, $x^2 + 8x + 16$ 의 값

55. $x = 0.55$, $y = 0.45$ 일 때, $x^2 - y^2$ 의 값

56. $x = 2 + \sqrt{3}$, $y = 2 - \sqrt{3}$ 일 때, $x^2 - y^2$ 의 값

57. $x = 93$ 일 때, $x^2 - 6x + 9$ 의 값

58. $x = 17$ 일 때, $x^2 - 5x - 14$ 의 값

59. $x = \sqrt{3} + 2$ 일 때, $x^2 - 4x + 4$ 의 값

60. $x = \frac{1}{2 + \sqrt{3}}$, $y = \frac{1}{2 - \sqrt{3}}$ 일 때, $x^2 - y^2$ 의 값

61. $x = 3 - \sqrt{6}$ 일 때, $x^2 - 6x + 5$ 의 값

62. $x = -1 + \sqrt{5}$ 일 때, $(x+2)^2 - 2(x+2) + 1$ 의 값

63. $x = \sqrt{3} + 2$, $y = \sqrt{3} - 2$ 일 때, $x^2 - 2xy + y^2$ 의 값

64. $x = 6.3$, $y = 3.7$ 일 때, $x^2 + 2xy + y^2$ 의 값

65. $x = 2 + \sqrt{5}$, $y = 2 - \sqrt{5}$ 일 때, $x^2 - y^2$ 의 값

66. $x = \sqrt{2} + \sqrt{7}$, $y = \sqrt{2} - \sqrt{7}$ 일 때, $x^2 + 2xy + y^2$ 의 값

67. $x = \sqrt{3} + \sqrt{5}$, $y = \sqrt{3} - \sqrt{5}$ 일 때, $x^2y - xy^2$ 의 값

68. $a = 43$, $b = 96$ 일 때, $ab + 4a - 3b - 12$ 의 값

69. $x = 1.7$, $y = 0.3$ 일 때, $x^2 - xy - 2y^2$ 의 값

70. $x = \frac{1}{\sqrt{2}-1}$, $y = \frac{1}{\sqrt{2}+1}$ 일 때, $x^2 + 2xy + y^2$ 의 값

71. $x = \frac{1}{2+\sqrt{3}}$, $y = \frac{1}{2-\sqrt{3}}$ 일 때, $x^3 - xy^2$

72. $x = 4 - \sqrt{5}$ 일 때, $(x-3)^2 - 2(x-3) + 1$

73. $a+b=4$ 일 때, $a^2 + ab + b^2 + (a-1)(b-1)$

74. $x+y=\sqrt{5}$, $x-y=\sqrt{3}$ 일 때, $x^2 - y^2 + 5x - 5y$

75. $x+y=3$, $x-y=2$ 일 때, $x^2 - y^2 + 4x - 4y$

76. $x = \frac{1}{5+2\sqrt{6}}$ 일 때, $x^2 - 10x + 21$

77. $x+y=9$, $x-y=5$ 일 때, $x^2 - y^2 + 3x + 3y$

78. $x^2 - 2x - 3 = 0$ 일 때, $(x-3)(x-1)(x+1)(x-3)$

79. $x = 2 + \sqrt{5}$ 일 때, $(x-1)^2 - 2(x-1) - 3$

80. $a+b=\sqrt{5}$, $a^2 - b^2 + 2b = 25$ 일 때, $a-b$

81. $x+y=\sqrt{2}+3$, $x-y=\sqrt{2}$ 일 때, $x^2 - y^2 - 3x - 3y$

82. $a-b=5$, $ax-bx-2ay+2by=30$ 일 때, $x^2 - 4xy + 4y^2$

83. $a+b=10$, $ab=5$ 일 때, $a^2 - b^2 + 4a - 4b$

84. $a+b=-4$, $a-b=5$ 일 때, $a^2 - b^2 - 6a + 9$

85. $x+2y=-4$, $x-2y=\sqrt{3}$ 일 때, $x^2 - 4y^2 + 6x + 9$

86. $a = \frac{1}{3-2\sqrt{2}}$, $b = \frac{1}{3+2\sqrt{2}}$ 일 때, $a^2 - b^2 + 5a - 5b$

87. $x = \sqrt{2} - 2$, $y = 2\sqrt{2}$ 일 때, $x^2 - 2xy + y^2 + 4x - 4y + 3$

88. $x = \sqrt{3} + 1$, $y = \sqrt{3} - 1$ 일 때, $x^2 + 2xy + y^2$

89. $x + y = 2\sqrt{3}$, $xy = 2$ 일 때, $x^2y - 4x - 4y + xy^2$

90. $x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$, $y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$ 일 때, $x^3 - x^2y - xy^2 + y^3$

91. $x = \frac{1}{3 - 2\sqrt{2}}$, $y = \frac{1}{3 + 2\sqrt{2}}$ 일 때, $(2x + y)^2 - (2x - y)^2$

92. $a = \sqrt{8} + 2\sqrt{3}$, $b = \sqrt{12} - 2\sqrt{2}$ 일 때, $a^4b^4 - 1$

93. $x^2 + 2x + 1 - y^2 = 40$, $x + y = 4$ 일 때, $x - y$

94. $x - y = 4$ 일 때, $\frac{1}{2}(x^2 + y^2) - xy$

95. $x = -4 + 2\sqrt{3}$, $y = -\sqrt{3} + 3$ 일 때,

$$\frac{x^2 + 3xy + 2y^2 + x + 2y}{x + y + 1}$$

96. $a = 3 - 2\sqrt{5}$, $b = \sqrt{5} - 1$ 일 때, $\frac{a + b + 1}{a^2 + 3ab + 2b^2 + a + 2b}$

정답 및 해설



1) 7500

2) 1500

$$\Rightarrow (\text{주어진 식}) = 15 \times (125 - 25) = 15 \times 100 = 1500$$

3) 400

$$\Rightarrow (\text{주어진 식}) = (101 + 99)(101 - 99) = 200 \times 2 = 400$$

4) 20

 $\Rightarrow (\text{주어진 식})$

$$= \sqrt{(52+48)(52-48)} = \sqrt{100 \times 4} = \sqrt{400} = 20$$

5) 10000

$$\Rightarrow (\text{주어진 식}) = (102 - 2)^2 = 100^2 = 10000$$

6) -10

$$\begin{aligned} \Rightarrow (\text{주어진 식}) &= (1+2)(1-2) + (3+4)(3-4) \\ &= -(1+2+3+4) = -10 \end{aligned}$$

7) 900

$$\Rightarrow 9 \times 67 + 9 \times 33 = 9 \times (67 + 33) = 9 \times 100 = 900$$

8) 550

$$\begin{aligned} \Rightarrow 11 \times 26 + 11 \times 24 &= 11 \times (26 + 24) \\ &= 11 \times 50 = 550 \end{aligned}$$

9) 380

$$\begin{aligned} \Rightarrow 19 \times 77 - 19 \times 57 &= 19 \times (77 - 57) \\ &= 19 \times 20 = 380 \end{aligned}$$

10) 90

$$\Rightarrow 45 \times 98 - 45 \times 96 = 45 \times (98 - 96) = 45 \times 2 = 90$$

11) 250

$$\begin{aligned} \Rightarrow 25 \times 8.5 + 25 \times 1.5 &= 25 \times (8.5 + 1.5) \\ &= 25 \times 10 = 250 \end{aligned}$$

12) 250

$$\begin{aligned} \Rightarrow 125 \times 3.4 - 125 \times 1.4 &= 125 \times (3.4 - 1.4) \\ &= 125 \times 2 = 250 \end{aligned}$$

13) 800

$$\begin{aligned} \Rightarrow 102^2 - 98^2 &= (102 + 98)(102 - 98) \\ &= 200 \times 4 = 800 \end{aligned}$$

14) 30000

$$\begin{aligned} \Rightarrow 175^2 - 25^2 &= (175 + 25)(175 - 25) \\ &= 200 \times 150 = 30000 \end{aligned}$$

15) 9600

$$\Rightarrow 98^2 - 4 = (98 + 2)(98 - 2) = 100 \times 96 = 9600$$

16) 10

$$\Rightarrow 5.5^2 - 4.5^2 = (5.5 + 4.5)(5.5 - 4.5) = 10 \times 1 = 10$$

17) 10

$$\begin{aligned} \Rightarrow \sqrt{26^2 - 24^2} &= \sqrt{(26+24)(26-24)} \\ &= \sqrt{50 \times 2} = \sqrt{100} = 10 \end{aligned}$$

18) 9

$$\begin{aligned} \Rightarrow \sqrt{40^2 - 40^2} &= \sqrt{(41+40)(41-40)} \\ &= \sqrt{81 \times 1} = \sqrt{81} = 9 \end{aligned}$$

19) 400

$$\begin{aligned} \Rightarrow 12^2 \times 5 - 8^2 \times 5 &= 5 \times (12^2 - 8^2) \\ &= 5 \times (12+8)(12-8) \\ &= 5 \times 20 \times 4 = 400 \end{aligned}$$

20) 650

$$\begin{aligned} \Rightarrow 2.5 \times 16.5^2 - 2.5 \times 3.5^2 &= 2.5 \times (16.5^2 - 3.5^2) \\ &= 2.5 \times (16.5 + 3.5)(16.5 - 3.5) \\ &= 2.5 \times 20 \times 13 = 650 \end{aligned}$$

21) 10000

$$\Rightarrow 95^2 + 2 \times 95 \times 5 + 5^2 = (95 + 5)^2 = 100^2 = 10000$$

22) 1600

$$\begin{aligned} \Rightarrow 36^2 + 2 \times 4 \times 36 + 16 &= 36^2 + 2 \times 4 \times 36 + 4^2 \\ &= (36 + 4)^2 = 40^2 = 1600 \end{aligned}$$

23) 3600

$$\begin{aligned} \Rightarrow 57^2 + 6 \times 57 + 3^2 &= 57^2 + 2 \times 57 \times 3 + 3^2 \\ &= (57 + 3)^2 = 60^2 = 3600 \end{aligned}$$

24) 4900

$$\begin{aligned} \Rightarrow 73^2 - 6 \times 73 + 9 &= 73^2 - 2 \times 73 \times 3 + 3^2 \\ &= (73 - 3)^2 = 70^2 = 4900 \end{aligned}$$

25) 900

$$\Rightarrow 31^2 - 2 \times 31 + 1 = (31 - 1)^2 = 30^2 = 900$$

26) 196

$$\begin{aligned} \Rightarrow 57^2 - 86 \times 57 + 43^2 &= 57^2 - 2 \times 57 \times 43 + 43^2 \\ &= (57 - 43)^2 = 14^2 = 196 \end{aligned}$$

27) 10000

$$\begin{aligned} \Rightarrow 104^2 - 8 \times 104 + 16 &= 104^2 - 2 \times 104 \times 4 + 4^2 \\ &= (104 - 4)^2 = 100^2 = 10000 \end{aligned}$$

28) 400

$$\begin{aligned} \Rightarrow 24.5^2 - 9 \times 24.5 + 4.5^2 &= 24.5^2 - 2 \times 24.5 \times 4.5 + 4.5^2 \\ &= (24.5 - 4.5)^2 = 20^2 = 400 \end{aligned}$$

29) 3140

30) 700

31) 110

32) 150

33) 115

34) 36

35) -1.5

36) 16

37) 52

38) 120

$$\begin{aligned} \Rightarrow 51^2 \times \frac{3}{5} - 49^2 \times \frac{3}{5} &= \frac{3}{5}(51^2 - 49^2) \\ &= \frac{3}{5}(51+49)(51-49) = \frac{3}{5} \times (100 \times 2) = 120 \end{aligned}$$

39) 90

40) 9400

41) 19900

 \Rightarrow (주어진 식)

$$\begin{aligned} &= \frac{(200+1)(200-1)}{200+1} \times 99 + 199 \\ &= 199 \times 99 + 199 = 199(99+1) = 199 \times 100 = 19900 \end{aligned}$$

42) $\frac{10}{3}$ 43) $\frac{1004}{1005}$

$$\begin{aligned} \Rightarrow \frac{2009^2 - 1}{2009 \times 2010 + 2009 + 1} &= \frac{(2009+1)(2009-1)}{2009(2009+1) + 2009 + 1} \\ &= \frac{2010 \times 2008}{(2009+1)^2} = \frac{2008}{2010} = \frac{1004}{1005} \end{aligned}$$

44) 1

 $\Rightarrow 994 = A$ 라 하면

$$\begin{aligned} \frac{A^2 + 8A + 12}{(998+2)(998-2)} &= \frac{(A+6)(A+2)}{1000 \times 996} \\ &= \frac{(994+6)(994+2)}{1000 \times 996} = 1 \end{aligned}$$

45) $\frac{1}{4}$

46) -153

47) 161

$$\begin{aligned} \Rightarrow 17^2 - 15^2 + 13^2 - 11^2 + 9^2 - 7^2 + 5^2 - 3^2 + 1^2 \\ &= (17+15)(17-15) + (13+11)(13-11) + \dots + (5+3)(5-3) + 1 \\ &= 2(17+15+13+11+9+7+5+3) + 1 \end{aligned}$$

 $= 161$

48) 2240

$$\begin{aligned} \Rightarrow 103^2 - 97^2 + 54^2 - 46^2 + 16^2 - 4^2 \\ &= (103+97)(103-97) + (54+46)(54-46) + (16+4)(16-4) \\ &= 200 \times 6 + 100 \times 8 + 20 \times 12 = 1200 + 800 + 240 = 2240 \end{aligned}$$

49) 57

$$\begin{aligned} \Rightarrow 12^2 - 11^2 + 10^2 - 9^2 + 8^2 - 7^2 \\ &= (12+11)(12-11) + (10+9)(10-9) + (8+7)(8-7) \\ &= 12+11+10+9+8+7 = 57 \end{aligned}$$

50) -220

$$\begin{aligned} \Rightarrow 2^2 - 4^2 + 6^2 - 8^2 + \dots + 18^2 - 20^2 \\ &= (2+4)(2-4) + (6+8)(6-8) + \dots + (18+20)(18-20) \\ &= -2(2+4+6+8+\dots+18+20) \\ &= -2 \times (22 \times 5) = -220 \end{aligned}$$

51) 10000

$$\Rightarrow x^2 + 4x + 4 = (x+2)^2 = (98+2)^2 = 100^2 = 10000$$

52) 10000

$$\Rightarrow x^2 - 6x + 9 = (x-3)^2 = (103-3)^2 = 100^2 = 10000$$

53) 3

$$\Rightarrow x^2 - 2x + 1 = (x-1)^2 = (1+\sqrt{3}-1)^2 = (\sqrt{3})^2 = 3$$

54) 2

$$\Rightarrow x^2 + 8x + 16 = (x+4)^2 = (-4+\sqrt{2}+4)^2 = (\sqrt{2})^2 = 2$$

55) 0.1

$$\begin{aligned} \Rightarrow x^2 - y^2 &= (x+y)(x-y) \\ &= (0.55+0.45)(0.55-0.45) = 1 \times 0.1 = 0.1 \end{aligned}$$

56) $8\sqrt{3}$

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

57) 8100

$$\Rightarrow x^2 - 6x + 9 = (x-3)^2 = (93-3)^2 = 90^2 = 8100$$

58) 190

$$\begin{aligned} \Rightarrow x^2 - 5x - 14 &= (x-7)(x+2) = (17-7)(17+2) \\ &= 10 \times 19 = 190 \end{aligned}$$

59) 3

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

60) $-8\sqrt{3}$

$$\Rightarrow x = \frac{1}{2+\sqrt{3}} = \frac{2-\sqrt{3}}{(2+\sqrt{3})(2-\sqrt{3})} = 2-\sqrt{3}$$

$$y = \frac{1}{2 - \sqrt{3}} = \frac{2 + \sqrt{3}}{(2 - \sqrt{3})(2 + \sqrt{3})} = 2 + \sqrt{3}$$

$$\begin{aligned} \therefore x^2 - y^2 &= (x+y)(x-y) \\ &= (2 - \sqrt{3} + 2 + \sqrt{3})(2 - \sqrt{3} - 2 - \sqrt{3}) \\ &= 4 \times (-2\sqrt{3}) \\ &= -8\sqrt{3} \end{aligned}$$

61) 2

$$\begin{aligned} \Rightarrow x^2 - 6x + 5 &= (x-5)(x-1) \\ &= (3 - \sqrt{6} - 5)(3 - \sqrt{6} - 1) \\ &= -(2 + \sqrt{6})(2 - \sqrt{6}) \\ &= -(4 - 6) = 2 \end{aligned}$$

62) 5

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

63) 16

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

64) 100

$$\begin{aligned} \Rightarrow x^2 + 2xy + y^2 &= (x+y)^2 = (6.3 + 3.7)^2 \\ &= 10^2 = 100 \end{aligned}$$

65) $8\sqrt{5}$

$$\begin{aligned} \Rightarrow x^2 - y^2 &= (x+y)(x-y) \\ &= (2 + \sqrt{5} + 2 - \sqrt{5})(2 + \sqrt{5} - 2 + \sqrt{5}) \\ &= 4 \times 2\sqrt{5} = 8\sqrt{5} \end{aligned}$$

66) 8

$$\begin{aligned} \Rightarrow x^2 + 2xy + y^2 &= (x+y)^2 \\ &= (\sqrt{2} + \sqrt{7} + \sqrt{2} - \sqrt{7})^2 \\ &= (2\sqrt{2})^2 = 8 \end{aligned}$$

67) $-4\sqrt{5}$

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

68) 4000

$$\begin{aligned} \Rightarrow ab + 4a - 3b - 12 &= a(b+4) - 3(b+4) \\ &= (a-3)(b+4) \\ &= (43-3)(96+4) \\ &= 40 \times 100 = 4000 \end{aligned}$$

69) 2.2

$$\begin{aligned} \Rightarrow x^2 - xy - 2y^2 &= (x-2y)(x+y) \\ &= (1.7 - 2 \times 0.3)(1.7 + 0.3) \\ &= 1.1 \times 2 = 2.2 \end{aligned}$$

70) 8

$$\Rightarrow x = \frac{1}{\sqrt{2}-1} = \frac{\sqrt{2}+1}{(\sqrt{2}-1)(\sqrt{2}+1)} = \sqrt{2}+1$$

$$y = \frac{1}{\sqrt{2}+1} = \frac{\sqrt{2}-1}{(\sqrt{2}+1)(\sqrt{2}-1)} = \sqrt{2}-1$$

$$\begin{aligned} \therefore x^2 + 2xy + y^2 &= (x+y)^2 \\ &= (\sqrt{2}+1 + \sqrt{2}-1)^2 \\ &= (2\sqrt{2})^2 = 8 \end{aligned}$$

71) $24 - 16\sqrt{3}$

$$\Rightarrow x = \frac{1}{2+\sqrt{3}} = 2 - \sqrt{3}, \quad y = \frac{1}{2-\sqrt{3}} = 2 + \sqrt{3}$$

$$\begin{aligned} \therefore x^3 - xy^2 &= x(x^2 - y^2) = x(x+y)(x-y) \\ &= (2 - \sqrt{3}) \times 4 \times (-2\sqrt{3}) = -16\sqrt{3} + 24 \end{aligned}$$

72) 5

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

73) 13

$$\begin{aligned} \Rightarrow a^2 + ab + b^2 + (a-1)(b-1) &= a^2 + ab + b^2 + ab - a - b + 1 \\ &= a^2 + 2ab + b^2 - a - b + 1 \\ &= (a+b)^2 - (a+b) + 1 \\ &= 16 - 4 + 1 = 13 \end{aligned}$$

74) $\sqrt{15} + 5\sqrt{3}$

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

75) 14

$$\begin{aligned} \Rightarrow x^2 - y^2 + 4x - 4y &= (x+y)(x-y) + 4(x-y) \\ &= (x-y)(x+y+4) = 2 \times 7 = 14 \end{aligned}$$

76) 20

$$\Rightarrow x = \frac{1}{5+2\sqrt{6}} = 5 - 2\sqrt{6}, \quad x-5 = -2\sqrt{6}$$

$$\therefore x^2 - 10x + 21 = (x-5)^2 - 4 = 24 - 4 = 20$$

77) 72

$$\begin{aligned} \Rightarrow x^2 - y^2 + 3x + 3y &= (x+y)(x-y) + 3(x+y) \\ &= (x+y)(x-y+3) = 9 \times 8 = 72 \end{aligned}$$

78) 0

$$\begin{aligned} \Rightarrow x^2 - 2x - 3 &= 0 \text{이므로} \\ (x-3)(x-1)(x+1)(x-3) &= (x-3)(x+1)(x-1)(x-3) \\ &= (x^2 - 2x - 3)(x^2 - 4x + 3) = 0 \times (x^2 - 4x + 3) = 0 \end{aligned}$$

79) 1

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

$$= (x-4)x = (-2 + \sqrt{5})(2 + \sqrt{5}) = 1$$

$$80) 5 + 6\sqrt{5}$$

$$\Rightarrow a^2 - b^2 + 2b = 25$$

$$\Rightarrow a^2 - b^2 + 2b - 1 = 25 - 1$$

$$\Rightarrow a^2 - (b-1)^2 = 24$$

$$\Rightarrow (a+b-1)(a-b+1) = 24$$

$$a+b = \sqrt{5} \text{ 이므로 } (\sqrt{5}-1)(a-b+1) = 24$$

$$a-b+1 = \frac{24}{\sqrt{5}-1} = 6(\sqrt{5}+1)$$

$$\therefore a-b = 6\sqrt{5}+5$$

$$81) -7$$

$$\begin{aligned} \Rightarrow x^2 - y^2 - 3x - 3y &= (x+y)(x-y) - 3(x+y) \\ &= (x+y)(x-y-3) = (\sqrt{2}+3)(\sqrt{2}-3) = -7 \end{aligned}$$

$$82) 36$$

$$\Rightarrow ax - bx - 2ay + 2by$$

$$= (a-b)x - 2(a-b)y$$

$$= (a-b)(x-2y) = 30$$

$$a-b = 5 \text{ 이므로 } x-2y = 6$$

$$\therefore x^2 - 4xy + 4y^2 = (x-2y)^2 = 36$$

$$83) \pm 56\sqrt{5}$$

$$\Rightarrow (a-b)^2 = (a+b)^2 - 4ab = 80 \quad \therefore a-b = \pm 4\sqrt{5}$$

$$\therefore a^2 - b^2 + 4a - 4b = (a+b)(a-b) + 4(a-b)$$

$$= (a-b)(a+b+4) = \pm 4\sqrt{5} \times 14 \pm 56\sqrt{5}$$

$$84) -14$$

$$\begin{aligned} \Rightarrow a^2 - b^2 - 6a + 9 &= (a-3)^2 - b^2 = (a+b-3)(a-b-3) \\ &= -7 \times 2 = -14 \end{aligned}$$

$$85) -3 - \sqrt{3}$$

$$86) 44\sqrt{2}$$

$$\Rightarrow a = \frac{1}{3-2\sqrt{2}} = 3+2\sqrt{2}, \quad b = \frac{1}{3+2\sqrt{2}} = 3-2\sqrt{2}$$

$$\therefore a^2 - b^2 + 5a - 5b = (a+b)(a-b) + 5(a-b)$$

$$= (a-b)(a+b+5) = 4\sqrt{2} \times 11 = 44\sqrt{2}$$

$$87) 1$$

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

$$88) 12$$

$$\begin{aligned} \Rightarrow x^2 + 2xy + y^2 &= (x+y)^2 = (\sqrt{3}+1 + \sqrt{3}-1)^2 \\ &= (2\sqrt{3})^2 = 12 \end{aligned}$$

$$89) -4\sqrt{3}$$

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

$$= (x+y)(xy-4) = 2\sqrt{3} \times (-2) = -4\sqrt{3}$$

$$90) 960$$

$$\Rightarrow x = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} = (\sqrt{3} + \sqrt{2})^2 = 5 + 2\sqrt{6}$$

$$y = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}} = (\sqrt{3} - \sqrt{2})^2 = 5 - 2\sqrt{6}$$

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

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

$$= (4\sqrt{6})^2 \times 10 = 960$$

$$91) 8$$

$$\Rightarrow x = \frac{1}{3-2\sqrt{2}} = 3+2\sqrt{2}, \quad y = \frac{1}{3+2\sqrt{2}} = 3-2\sqrt{2}$$

$$\therefore (2x+y)^2 - (2x-y)^2 = 4x \times 2y = 8xy = 8$$

$$92) 255$$

$$\Rightarrow a = 2\sqrt{2} + 2\sqrt{3}, \quad b = 2\sqrt{3} - 2\sqrt{2} \text{ 이므로,}$$

$$ab = (2\sqrt{3} + 2\sqrt{2})(2\sqrt{3} - 2\sqrt{2}) = 12 - 8 = 4 \text{ 이다.}$$

$$\therefore a^4b^4 - 1 = (ab)^4 - 1 = 4^4 - 1 = 256 - 1 = 255$$

$$93) 7$$

$$\Rightarrow x^2 + 2x + 1 - y^2 = 40$$

$$(x+1)^2 - y^2 = 40$$

$$(x+y+1)(x-y+1) = 40$$

$$x-y+1 = 8 \quad \therefore x-y = 7$$

$$94) 8$$

$$\Rightarrow \frac{1}{2}(x^2 + y^2) - xy = \frac{1}{2}(x^2 - 2xy + y^2)$$

$$= \frac{1}{2}(x-y)^2 = \frac{1}{2} \times 16 = 8$$

$$95) 2$$

$$\Rightarrow (\text{주어진 식})$$

$$= \frac{(x+2y)(x+y) + x + 2y}{x+y+1} = \frac{(x+2y)(x+y+1)}{x+y+1} = x+2y$$

$$= -4 + 2\sqrt{3} + 2(-\sqrt{3}+3) = -4 + 2\sqrt{3} - 2\sqrt{3} + 6 = 2$$

$$96) 1$$

$$\Rightarrow \frac{a+b+1}{(a^2+3ab+2b^2+a+2b)}$$

$$= \frac{a+b+1}{(a+2b)(a+b)+a+2b} = \frac{a+b+1}{(a+2b)(a+b+1)} = \frac{1}{a+2b}$$

$$= \frac{1}{3-2\sqrt{5}+2\sqrt{5}-2} = \frac{1}{1} = 1$$