PHƯƠNG TRÌNH VÔ TỈ

BÀI TẬP CƠ BẢN

Bài 1: Giải các phương trình sau:

1. $\sqrt{x^2 - 6x + 9} = x$

2. $\sqrt{4x^2 - 12x + 9} = x - 1$

3. $x + \sqrt{4x^2 - 4x + 1} = 2$

4. $1 - \sqrt{4x^4 - 20x^2 + 25} = 0$

5. $x^2 - \sqrt{x^2} = 0$

6. $x^2 + \sqrt{x^2} = 0$

7. $x + \sqrt{x^2 - 4x + 4} = 0$

8. $x - \sqrt{4x^2 - 12x + 9} = 0$

9. $3x - 1 - \sqrt{4x^2 - 12x + 9} = 0$

10. $x - \sqrt{4x^2 - 12x + 9} = 3$

11. $\sqrt{3 - 2\sqrt{2}} - \sqrt{x^2 + 2x\sqrt{3} + 3} = 0$

12. $\sqrt{5x^2 - 2x\sqrt{5} + 1} = \sqrt{6 - 2\sqrt{5}}$

13. $\sqrt{4x^2 + 4x\sqrt{7} + 7} - \sqrt{8 - 2\sqrt{7}} = 0$

14. $\sqrt{7 - 2\sqrt{10}} - \sqrt{5x^2 - 2x\sqrt{10} + 2} = 0$

15. $\sqrt{11 + 6\sqrt{2}} = \sqrt{2x^2 - 6x\sqrt{2} + 9}$

16. $\sqrt{11 - \sqrt{120}} = \sqrt{5x^2 + x\sqrt{120} + 6}$

17. $\sqrt{1 + 2x\sqrt{3} + 3x^2} - \sqrt{3 + 2x\sqrt{3} + x^2} = 0$

18. $\sqrt{5x^2 - 2x\sqrt{5} + 1} - \sqrt{4x^2 + 4x\sqrt{5} + 5} = 0$

19. $\sqrt{16x^2 + 8x\sqrt{2} + 2} - \sqrt{9x^2 - 6x\sqrt{2} + 2} = 0$

20. $\sqrt{2x^2 - 2x\sqrt{6} + 3} - \sqrt{2 - 2x\sqrt{6} + 3x^2} = 0$

21. $\sqrt{8x^2 - 4x\sqrt{2} + 1} - \sqrt{x^2 - 6x\sqrt{2} + 18} = 0$

22. $\sqrt{5x^2 + 2x\sqrt{30} + 6} - \sqrt{6x^2 + 2x\sqrt{30} + 5} = 0$

23. $\sqrt{x^2} = x$

24. $\sqrt{x^2 - 2x + 1} = x - 1$

25. $\sqrt{x^2 - 4x + 4} = x - 2$

26. $\sqrt{16 - 8x + x^2} = 4 - x$

27. $\sqrt{4x^2 - 12x + 9} = 2x - 3$

28. $\sqrt{25x^2 - 10x + x} = 5x - 1$

29. $\sqrt{x^2 - 2x\sqrt{5} + 5} = x - \sqrt{5}$

30. $\sqrt{3x^2 - 6x\sqrt{2} + 6} = \sqrt{3}x - \sqrt{6}$

31. $\sqrt{10x^2 - 12x\sqrt{10} + 36} = \sqrt{10}x - 6$

32. $\sqrt{7x^2 + 2x\sqrt{14} + 2} = \sqrt{7}x + \sqrt{2}$

33. $\sqrt{x^2} = -x$

34. $\sqrt{x^2 - 6x + 9} = 3 - x$

35. $\sqrt{x^2 - 4x + 4} = 2 - x$

36. $\sqrt{x^2 + 4x + 4} = -x - 2$

37. $\sqrt{4x^2 + 4x + 1} = -2x - 1$

38. $\sqrt{x^2 + x + \dfrac{1}{4}} = -x - \dfrac{1}{2}$

39. $\sqrt{x + 2\sqrt{x} + 1} - \sqrt{x - 2\sqrt{x} + 1} = 2$

40. $\sqrt{x + 4\sqrt{x} + 4} + \sqrt{x - 4\sqrt{x} + 4} = 4$

41. $\sqrt{x + 6\sqrt{x} + 9} - 6 = \sqrt{9 - 6\sqrt{x} + x}$

42. $\sqrt{4x + 4\sqrt{x} + 1} = \sqrt{1 - 4\sqrt{x} + 4x} + 2$

43. $\sqrt{x - 2\sqrt{x - 1}} - \sqrt{x + 2\sqrt{x - 1}} = -2$

44. $\sqrt{x - 2\sqrt{x - 2} - 1} - \sqrt{x + 2 + 4\sqrt{x - 2} + 3} = 0$

45. $-\sqrt{x + 3 + 4\sqrt{x - 1}} + \sqrt{x + 8 - 6\sqrt{x - 1}} = -5$

46. $\sqrt{x + 4\sqrt{x - 4}} - \sqrt{x - 4\sqrt{x - 4}} = 4$

47. $-\sqrt{2x + 4 + 6\sqrt{2x - 5}} + \sqrt{2x - 4 - 2\sqrt{2x - 5}} = -4$

48. $4 + \sqrt{2x + 6 - 6\sqrt{2x - 3}} = \sqrt{2x - 2 + 2\sqrt{2x - 3}}$

49. $\sqrt{x + 2\sqrt{x} + 1} + \sqrt{x - 2\sqrt{x} + 1} = 2$

50. $\sqrt{x - 2\sqrt{x - 1}} + \sqrt{x + 2\sqrt{x - 1}} = 2$

51. $\sqrt{x - 2\sqrt{x - 2} - 1} + \sqrt{x + 2 + 4\sqrt{x - 2}} - 3 = 0$

52. $\sqrt{x + 3 + 4\sqrt{x - 1}} + \sqrt{x + 8 - 6\sqrt{x - 1}} = 5$

53. $\sqrt{x + 4\sqrt{x-4}} + \sqrt{x - 4\sqrt{x-4}} = 4$

54. $\sqrt{2x + 4 + 6\sqrt{2x-5}} + \sqrt{2x - 4 - 2\sqrt{2x-5}} = 4$

55. $\sqrt{2x + 2\sqrt{2x} + 1} - \sqrt{2x - 2\sqrt{2x} + 1} = 2$

56. $\sqrt{4 + 4\sqrt{3x} + 3x} - 4 = \sqrt{4 - 4\sqrt{3x} + 3x}$

57. $\sqrt{12x - 4\sqrt{3x} + 1} - \sqrt{1 + 4\sqrt{3x} + 12x} = -2$

58. $\sqrt{18x + 6\sqrt{2x} + 1} - \sqrt{1 - 6\sqrt{2x} + 18x} = 2$.

Bài 2: Giải các phương trình sau:

1. $\sqrt{2x-3} = \sqrt{x-1}$

2. $\sqrt{2x-3} - \sqrt{x+3} = 0$

3. $\sqrt{x-1} = \sqrt{2x+3}$

4. $\sqrt{2x-3} = \sqrt{x+1}$

5. $\sqrt{x+2} = \sqrt{2x-4}$

6. $\sqrt{2-x} = \sqrt{3+x}$

7. $\sqrt{1-x} - \sqrt{x-3} = 0$

8. $\sqrt{-2x} - \sqrt{2-x} = 0$

9. $\sqrt{6-x} - \sqrt{-3x} = 0$

10. $\sqrt{x^2 - 3x} - \sqrt{5(3-x)} = 0$

11. $\sqrt{x-2} = \sqrt{x-2}$

12. $\sqrt{4x-8} = 2\sqrt{x-2}$

13. $\sqrt{x-1} - \sqrt{x-4} = 0$

14. $\sqrt{2-x} - \sqrt{3-x} = 0$

15. $\sqrt{x^2 - 5} = \sqrt{4x-9}$

16. $\sqrt{2x^2 - 6x + 2} = \sqrt{x^2 - 3x}$

17. $\sqrt{x^2 - 2x - 4} = \sqrt{2-x}$

18. $\sqrt{x^2 - x - 1} = \sqrt{x-1}$

19. $\sqrt{x-2} - \sqrt{x^2 - 2x} = 0$

20. $\sqrt{x^2 - x - 2} = \sqrt{x+1}$

21. $\sqrt{2x^2 - 10x + 11} = \sqrt{x^2 - 6x + 8}$

22. $\sqrt{2x^2 + 6x - 3} = \sqrt{x^2 + 4x}$

23. $\sqrt{2x^2 + x - 9} = \sqrt{x^2 - x - 6}$

24. $\sqrt{x-1} = 2$

25. $\sqrt{2x-3} = 13$

26. $\sqrt{2x-3} = \sqrt{2}$

27. $\sqrt{x(x-2)} - \sqrt{3} = 0$

28. $3\sqrt{x} = -1$

29. $\sqrt{x-1}+2=0$

30. $6-\sqrt{2x+3}=12$

31. $3\sqrt{x^2-x}-\sqrt{54}=0$

32. $2\sqrt{2}-\sqrt{x^2+2x}=0$

33. $2\sqrt{3}-\sqrt{7x-x^2}=0$

34. $3-\sqrt{x^2+3}=0$

35. $2-\sqrt{x(4-x)}=0$

36. $3-\sqrt{-x(x+6)}=0$

37. $2-\sqrt{x^2-1}=0$

38. $1-\sqrt{x^2-2}=0$

39. $\sqrt{16}-2\sqrt{x^2+3x}=0$

40. $2\sqrt{3}-\sqrt{x(x+7)}=0$

41. $\sqrt{3-x}=3x-5$

42. $x-\sqrt{4x-3}=2$

43. $\sqrt{x^2-x}=x$

44. $\sqrt{x^2-1}=x-1$

45. $\sqrt{3-x^2}=x$

46. $\sqrt{x^2-2x+2}=x-1$

47. $\sqrt{5-x^2}=x-1$

48. $x-2=\sqrt{x^2-4x+3}$

49. $\sqrt{x}-x=0$

50. $\sqrt{x}+x=0$

51. $x-\sqrt{2x-9}=6$

52. $2x-\sqrt{4x-1}=0$

53. $3x-\sqrt{6x-1}=0$

54. $x-2\sqrt{x-1}=16$

55. $x+\sqrt{-(2x+1)}=0$

56. $x+2\sqrt{x-1}=0$

57. $x+\sqrt{3(6-x)}=0$

58. $x+\sqrt{x+3}=0$

59. $x+\sqrt{2x+3}=0$

60. $x+\sqrt{5-4x}=0$

61. $2x+\sqrt{3x+7}=0$

62. $3x+\sqrt{5x+4}=0$

63. $2x-\sqrt{x(1-2x)}=1$

64. $x+\sqrt{1-x^2}=1$

65. $x+\sqrt{4-x^2}=2$

66. $2x+\sqrt{4|x|-1}=0$

67. $x+2\sqrt{|x|-1}=0$

68. $-5x + \sqrt{2|x|+3} = 0$

69. $3\sqrt{-2|x|+1} = 9x$

70. $7x + \sqrt{|x|-4} = 0$

71. $\sqrt{10|x|-10} - 6x = 0$

72. $\sqrt{-3|x|+2} + 1 = x$

73. $\sqrt{7|x|+11} + x + 1 = 0$

74. $\sqrt{2|x-1|-3} - x + 1 = 0$

75. $-3\sqrt{2|2x+1|-5} + 6x + 3 = 0$

76. $5\sqrt{2|1-5x|+3} - 5 + 25x = 0$

77. $-2\sqrt{-8|2-3x|+9} + 4 - 6x = 0$

78. $7\sqrt{-4|3x-9|+5} + 21x - 63 = 0$

79. $\sqrt{-2|1-2x|+3} + 1 = 2x$

80. $3\sqrt{2x} - 5\sqrt{8x} + 7\sqrt{18x} = 8$

81. $\dfrac{5}{3}\sqrt{15x} - \sqrt{15x} + 11 = \dfrac{1}{3}\sqrt{15x}$

82. $\sqrt{4x+20} - \sqrt{x+5} - \dfrac{1}{3}\sqrt{9x+45} = 4$

83. $\sqrt{36x-36} - \sqrt{9x-9} - \sqrt{4x-4} = 16 - \sqrt{x-1}$

84. $\sqrt{36x-72} - \sqrt{9x-18} + \sqrt{4x-8} + \sqrt{x-2} = \sqrt{72}$

85. $\sqrt{9x+18} - \sqrt{x+2} - \sqrt{4x+8} + 2\sqrt{x+5} = 0$

86. $\dfrac{5}{3}\sqrt{45x} - \sqrt{125x} - \dfrac{1}{3}\sqrt{405x} - 2\sqrt{16-16x} = 0$

87. $\dfrac{1}{5}\sqrt{25x-125} - \dfrac{3}{2}\sqrt{x-5} + \sqrt{36x-180} + \sqrt{9x-27} = 0$

88. $\sqrt{36x-216} - \sqrt{x-6} + \dfrac{7}{2}\sqrt{4x-24} = \dfrac{3}{7}\sqrt{49x-343}$

89. $15\sqrt{x-7} - 2\sqrt{9x-63} - 9\sqrt{25x-175} = \sqrt{4x-24}$

90. $\sqrt{49x-98} - \sqrt{9x-18} - \sqrt{16x-32} = \sqrt{4x-4}$

91. $7\sqrt{x} + \sqrt{81x-81} + \sqrt{x-1} = \sqrt{100x-100}$

92. $\sqrt{x^2 - 2x\sqrt{5}+5} + \sqrt{x^2 - x\sqrt{5}} = 0$

93. $\sqrt{0,2x^2 - 2x + 5} + \sqrt{3x^2 - 15x} = 0$

94. $\sqrt{x^2 + 4x} + \sqrt{\dfrac{x^2}{2} - 8} = 0$

95. $\sqrt{x-1} + \sqrt{x^2 - 3x + 2} = 0$

96. $\sqrt{2 + x} + \sqrt{4x^2 - 6x - 10} = 0$

97. $\sqrt{x^2 - 9} + \sqrt{x^2 - 4x + 3} = 0$

98. $\sqrt{-2x^2 + 3x + 5} + \sqrt{2x^2 - 7x - 15} = 0$

LUYỆN TẬP

Bài 3: Giải các phương trình sau:

1. $x^2 + 4\left(|x - 2| - x\right) - 1 = 0$

    a) Đặt $t = |x - 2|$ để đưa phương trình trên về phương trình theo ẩn t.

    b) Tìm t rồi sau đó tìm x.

2. $x^2 + 2\left(|x - 1| - x\right) - 2 = 0$

3. $x^2 + 3\left(|x - 3| - 2x\right) - 9 = 0$

4. $x^2 + 4\left(|x - 4| - 2x\right) + 4 = 0$

5. $x^2 + \left(x + |x + 1|\right) - 14 = 0$

6. $7 - 4\sqrt{2x - 1} = 3|1 - 2x|$

    a) Đặt $t = \sqrt{3 - 2x}$ để đưa phương trình trên về phương trình theo ẩn t.

    b) Tìm t rồi sau đó tìm x.

7. $5 - \sqrt{3 - 2x} = |2x - 3|$

8. $20 - \sqrt{3 - 2x} = |2x - 3|$

9. $12 - \sqrt{4 - 3x} = |3x - 4|$

10. $|1 - 2x| = 6 - \sqrt{2x - 1}$

11. $2|4 - 3x| + 3\sqrt{3x - 4} - 2 = 0$

12. $3|3x - 1| + 8\sqrt{1 - 3x} = 3$

13. $2\sqrt{\dfrac{6x - 1}{2x}} = \dfrac{2x}{6x - 1} + 1$

a) Đặt $t = \sqrt{\dfrac{6x-1}{2x}}$ để đưa phương trình trên về phương trình theo ẩn t.

b) Tìm t rồi sau đó tìm x.

14. $2\sqrt{\dfrac{3x-1}{x}} = \dfrac{x}{3x-1} + 1$

15. $2\sqrt{\dfrac{6x-1}{2x}} = \dfrac{2x}{6x-1} + 1$

16. $2\sqrt{\dfrac{9x-1}{3x}} = \dfrac{3x}{9x-1} + 1$

17. $2\sqrt{\dfrac{3x-3}{x}} = \dfrac{3x}{x-1} + 1$

18. $\sqrt{\dfrac{6x-4}{x}} = \dfrac{x}{3x-2} + 1$

19. $\sqrt{\dfrac{2x-1}{x}} + 1 + \sqrt{\dfrac{x}{2x-1}} = 3\dfrac{x}{2x-1}$

20. $2\sqrt{\dfrac{x}{x-1}} - \sqrt{\dfrac{x-1}{x}} = 2\dfrac{x-1}{x} + 3$

21. $3\sqrt{\dfrac{2x}{x-1}} + 4\sqrt{\dfrac{x-1}{2x}} = 3\dfrac{x-1}{2x} + 10$

22. $\sqrt{\dfrac{x}{3-2x}} + 5\sqrt{\dfrac{3-2x}{x}} = 4\dfrac{3-2x}{x} + 5$

23. $2\sqrt{\dfrac{2x+1}{x}} - 3\sqrt{\dfrac{x}{2x+1}} = 4\dfrac{x}{2x+1} + 7$

24. $\dfrac{2+\sqrt{19-2x}}{x} = 1$
25. $\sqrt{x} - \dfrac{4}{\sqrt{2+x}} + \sqrt{2+x} = 0$

26. $\sqrt{9-5x} = \sqrt{3-x} + \dfrac{6}{\sqrt{3-x}}$
27. $\sqrt{2-x} + \dfrac{4}{3+\sqrt{2-x}} = 2$

28. $\dfrac{(5-x)\sqrt{5-x} + (x-3)\sqrt{x-3}}{\sqrt{5-x} + \sqrt{x-3}} = 2$

Bài 4: Giải các phương trình sau:

1. $\sqrt{2x+3} + \sqrt{2x+2} = 1$
2. $\sqrt{1-x} + \sqrt{4+x} = 3$

3. $\sqrt{x+4} - \sqrt{2x-6} = 1$

4. $\sqrt{3x-5} + \sqrt{2x+3} = \sqrt{x+2}$

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

6. $\sqrt{3x+7} - \sqrt{x+1} = 2$ 7. $\sqrt{x+3} + \sqrt{x-1} = 2$

8. $\sqrt{x+5} + \sqrt{3-x} = 4$ 9. $\sqrt{x^2+9} - \sqrt{x^2+7} = 2$

10. $\sqrt{2-x^2} + \sqrt{x^2+8} = 4$ 11. $\sqrt{x+3} - \sqrt{7-x} = \sqrt{2x-8}$

12. $\sqrt{2-x} = \sqrt{7-x} - \sqrt{-3-2x}$ 13. $\sqrt{11-x} - \sqrt{x-1} = 2$

14. $\sqrt{x^2+3x+2} - \sqrt{x^2+x+1} = 1$ 15. $\sqrt{5x-1} = \sqrt{3x-2} - \sqrt{2x-3}$

16. $\sqrt{5x-1} - \sqrt{x-1} = \sqrt{2x-4}$

17. $\sqrt{x+2} - \sqrt{2x-3} = \sqrt{3x-5}$

18. $\sqrt{x+4} - \sqrt{1-x} = \sqrt{1-2x}$

19. $\sqrt{x+9} = 5 - \sqrt{2x+4}$

20. $\sqrt{3x+4} - \sqrt{2x+1} = \sqrt{x+3}$

21. $\sqrt{x+12} + \sqrt{x-6} - \sqrt{x+2} - \sqrt{x-4} = 0$

22. $\sqrt{3x+6} + \sqrt{3x-3} - \sqrt{3x+1} - \sqrt{3x-2} = 0$

23. $\sqrt{x+4} + \sqrt{x-5} - \sqrt{x-1} - \sqrt{x-4} = 0$

24. $\sqrt{2x+6} + \sqrt{2x-3} - \sqrt{2x+1} - \sqrt{2x-2} = 0$

25. $\sqrt{x+6} + \sqrt{x-3} - \sqrt{x+1} - \sqrt{x-2} = 0$

26. $\begin{cases} x - y = 5 \\ \sqrt{2x+1} - \sqrt{y+2} = 2 \end{cases}$

27. $\sqrt{x + \sqrt{x+11}} + \sqrt{x - \sqrt{x+11}} = 4$

28. $\sqrt{x - \sqrt{x-2}} + \sqrt{x + \sqrt{x-2}} = 3$

29. $\dfrac{2-\sqrt{x}}{2-x} = \sqrt{\dfrac{2}{2-x}}$

30. $\sqrt{\dfrac{20+x}{x}} + \sqrt{\dfrac{20-x}{x}} = \sqrt{6}$ (đặt $t = \dfrac{20}{x}$)

Bài 5: Giải các phương trình sau:

1. $\sqrt{2x+1} + \sqrt{x-3} = 2\sqrt{x}$　　　　2. $\sqrt{x+2} - \sqrt{2x-3} = \sqrt{4x-7}$

3. $\sqrt{x} + \sqrt{x-3} = \sqrt{3(x-1)}$　　　　4. $\sqrt{x-2} + \sqrt{4-x} = \sqrt{6-x}$

5. $\sqrt{x+5} = 2\sqrt{x} - \sqrt{2x-7}$　　　　6. $\sqrt{3x+12} - \sqrt{4x+13} = \sqrt{x+1}$

7. $\sqrt{9-x} - \sqrt{x+4} = \sqrt{3x+1}$　　　　8. $\sqrt{3x+4} = 2\sqrt{x} - \sqrt{x-4}$

9. $\sqrt{2x+5} = \sqrt{12x+25} - \sqrt{5x+6}$　　　10. $\sqrt{x+1} + \sqrt{x-1} = \sqrt{3x-1}$

11. $\sqrt{3x-5} + \sqrt{2x-3} = \sqrt{x+2}$　　　12. $\sqrt{x^2+9} - \sqrt{x^2-7} = 2$

13. $\sqrt{x^2+5} + \sqrt{x^2-3} = 4$　　　　14. $\sqrt{x^2-3x+6} + \sqrt{x^2-3x+3} = 3$

15. $\sqrt{3x^2-2x+15} + \sqrt{3x^2-2x+8} = 7$

16. $\sqrt{3x^2+5x+8} - \sqrt{3x^2+5x+1} = 1$

Bài 6: Giải các phương trình sau:

1. $\sqrt{x+6} + \sqrt{x-3} - \sqrt{x+1} - \sqrt{x-2} = 0$

2. $\sqrt{x^2+x-5} + \sqrt{x^2+8x-4} = 5$

3. $\sqrt{3x^2+6x+16} + \sqrt{x^2+2x} = 2\sqrt{x^2+2x+4}$

4. $\sqrt{2x^2-9x+4} + 3\sqrt{2x-1} = \sqrt{2x^2+21x-11}$

Bài 7: Giải các bất phương trình sau:

1. $\sqrt{3x-5x^2} \le 5x-2$ (PTNK, AB, 2006-2007, Vòng 1)

2. $\sqrt{5-x} \le 2x-7$

3. $\sqrt{x+1} < 2x-1$ (PTNK, AB, 2002-2003, Vòng 1)

4. $\sqrt{x^2-x-12} < 7-x$

5. $1 - x + \sqrt{2x^2 - 3x - 5} < 0$

6. $\sqrt{x^2 - 3x - 10} \leq x - 2$

7. $3\sqrt{-x^2 + x + 6} + 2(2x - 1) < 0$

8. $\sqrt{3x^2 + 13x + 4} + 2 - x \leq 0$

9. $2\sqrt{3x + x^2} \leq 2x - 1$

10. $\sqrt{x^2 - 3x + 3} \leq 2x - 1$

11. $\sqrt{x^2 + 3x - 3} \leq 2x - 3$

12. $-6x + 7 \geq \sqrt{x^2 - 6x + 7}$

13. $\sqrt{x^2 - 3x - 10} \leq 8 - x$

14. $\sqrt{x^2 + 5x - 6} < 2x + 3$

15. $\sqrt{x + 3} < x + 1$

16. $\sqrt{2x + 12} < x + 2$

17. $\sqrt{x^2 - 6x - 40} \leq 16 - x$

18. $\sqrt{x^2 + 10x + 4} \leq 2x - 4$

19. $3\sqrt{-x^2 + 3x + 54} + 4x - 6 < 0$

20. $2 - x + \sqrt{2x^2 - 6x - 20} < 0$

Bài 8: Giải các bất phương trình sau:

3. $\sqrt{3x - 5x^2} \geq 5x - 2$

2. $\sqrt{5 - x} \geq 2x - 7$

3. $\sqrt{x + 1} \geq 2x - 1$

4. $\sqrt{x^2 - x - 12} \geq 7 - x$

5. $1 - x + \sqrt{2x^2 - 3x - 5} > 0$

6. $\sqrt{x^2 - 3x - 10} \geq x - 2$

7. $3\sqrt{-x^2 + x + 6} + 2(2x - 1) > 0$

8. $\sqrt{3x^2 + 13x + 4} + 2 - x \geq 0$

9. $2\sqrt{3x + x^2} \geq 2x - 1$

10. $\sqrt{x^2 - 3x + 3} \geq 2x - 1$

11. $\sqrt{x^2 + 3x - 3} \leq 2x - 3$

12. $-4x + 2 \leq 4\sqrt{x^2 - 6x + 5}$

13. $\sqrt{x^2 - 3x - 10} \geq 8 - x$

14. $\sqrt{x^2 + 5x - 6} > 2x + 3$

15. $\sqrt{x + 3} > x + 1$

16. $\sqrt{2x + 12} > x + 2$

17. $\sqrt{x^2 - 6x - 40} \geq 16 - x$

18. $\sqrt{x^2 + 10x + 4} \geq 2x - 4$

19. $3\sqrt{-x^2 + 3x + 54} + 4x - 6 > 0$

20. $2 - x + \sqrt{2x^2 - 6x - 20} > 0$