Gleichungen mit Substitution lösen

Stufe 1: biquadratische Gleichungen

Name: _____ Datum: _____

Biquadratische Gleichungen: Ersetze x² durch z.

1) $x^4 - 26x^2 + 25 = 0$ _____

2) $2x^4 - 14x^2 - 288 = 0$ _____

3) $x^4 - 5x^2 + 6 = 0$ _____

4) $2x^4 - 18x^2 + 40 = 0$ _____

5) $x^4 - 3x^2 - 4 = 0$ _____

6) $x^4 - 15x^2 - 16 = 0$ _____

7) $x^4 - x^2 - 20 = 0$ _____

8) $x^4 - 28x^2 + 75 = 0$ _____

9) $2x^4 - 36x^2 + 64 = 0$ _____

10) $x^4 - 20x^2 + 64 = 0$ _____

11) $x^4 - 21x^2 - 100 = 0$ _____

12) $2x^4 - 6x^2 + 4 = 0$ _____

13) $2x^4 - 10x^2 + 12 = 0$ _____

14) $x^4 - 14x^2 + 45 = 0$ _____

15) $x^4 - 12x^2 + 27 = 0$ _____

16) $x^4 + x^2 - 12 = 0$ _____

Lösungen: Gleichungen mit Substitution lösen

Stufe 1: biquadratische Gleichungen

1) $z = x^2:\ z^2 - 26z + 25 = 0,\ z_1 = 1,\ z_2 = 25;\ x^2 = 1,\ x^2 = 25 \Rightarrow L = \{-5;\ -1;\ 1;\ 5\}$

2) $z = x^2:\ z^2 - 7z - 144 = 0,\ z_1 = -9,\ z_2 = 16;\ z = -9:$ keine Lösung, $x^2 = 16 \Rightarrow L = \{-4;\ 4\}$

3) $z = x^2:\ z^2 - 5z + 6 = 0,\ z_1 = 2,\ z_2 = 3;\ x^2 = 2,\ x^2 = 3 \Rightarrow L = \{-\sqrt{3};\ -\sqrt{2};\ \sqrt{2};\ \sqrt{3}\}$

4) $z = x^2:\ z^2 - 9z + 20 = 0,\ z_1 = 4,\ z_2 = 5;\ x^2 = 4,\ x^2 = 5 \Rightarrow L = \{-\sqrt{5};\ -2;\ 2;\ \sqrt{5}\}$

5) $z = x^2:\ z^2 - 3z - 4 = 0,\ z_1 = -1,\ z_2 = 4;\ z = -1:$ keine Lösung, $x^2 = 4 \Rightarrow L = \{-2;\ 2\}$

6) $z = x^2:\ z^2 - 15z - 16 = 0,\ z_1 = -1,\ z_2 = 16;\ z = -1:$ keine Lösung, $x^2 = 16 \Rightarrow L = \{-4;\ 4\}$

7) $z = x^2:\ z^2 - z - 20 = 0,\ z_1 = -4,\ z_2 = 5;\ z = -4:$ keine Lösung, $x^2 = 5 \Rightarrow L = \{-\sqrt{5};\ \sqrt{5}\}$

8) $z = x^2:\ z^2 - 28z + 75 = 0,\ z_1 = 3,\ z_2 = 25;\ x^2 = 3,\ x^2 = 25 \Rightarrow L = \{-5;\ -\sqrt{3};\ \sqrt{3};\ 5\}$

9) $z = x^2:\ z^2 - 18z + 32 = 0,\ z_1 = 2,\ z_2 = 16;\ x^2 = 2,\ x^2 = 16 \Rightarrow L = \{-4;\ -\sqrt{2};\ \sqrt{2};\ 4\}$

10) $z = x^2:\ z^2 - 20z + 64 = 0,\ z_1 = 4,\ z_2 = 16;\ x^2 = 4,\ x^2 = 16 \Rightarrow L = \{-4;\ -2;\ 2;\ 4\}$

11) $z = x^2:\ z^2 - 21z - 100 = 0,\ z_1 = -4,\ z_2 = 25;\ z = -4:$ keine Lösung, $x^2 = 25 \Rightarrow L = \{-5;\ 5\}$

12) $z = x^2:\ z^2 - 3z + 2 = 0,\ z_1 = 1,\ z_2 = 2;\ x^2 = 1,\ x^2 = 2 \Rightarrow L = \{-\sqrt{2};\ -1;\ 1;\ \sqrt{2}\}$

13) $z = x^2:\ z^2 - 5z + 6 = 0,\ z_1 = 2,\ z_2 = 3;\ x^2 = 2,\ x^2 = 3 \Rightarrow L = \{-\sqrt{3};\ -\sqrt{2};\ \sqrt{2};\ \sqrt{3}\}$

14) $z = x^2:\ z^2 - 14z + 45 = 0,\ z_1 = 5,\ z_2 = 9;\ x^2 = 5,\ x^2 = 9 \Rightarrow L = \{-3;\ -\sqrt{5};\ \sqrt{5};\ 3\}$

15) $z = x^2:\ z^2 - 12z + 27 = 0,\ z_1 = 3,\ z_2 = 9;\ x^2 = 3,\ x^2 = 9 \Rightarrow L = \{-3;\ -\sqrt{3};\ \sqrt{3};\ 3\}$

16) $z = x^2:\ z^2 + z - 12 = 0,\ z_1 = -4,\ z_2 = 3;\ z = -4:$ keine Lösung, $x^2 = 3 \Rightarrow L = \{-\sqrt{3};\ \sqrt{3}\}$