

Lösungen zu Übung 10.

1. a) $z = x^2, 0 = z^2 - 5z + 4; p = -5, q = 4$
 $z_1 = 1 \Rightarrow x_{1/2} = \pm\sqrt{1} = \pm 1$
 $z_2 = 4 \Rightarrow x_{3/4} = \pm\sqrt{4} = \pm 2$
- c) $z = x^2, 0 = 2z^2 - 14z + 24;$
 $p = -7, q = 12$
 $z_1 = 3 \Rightarrow x_{1/2} = \pm\sqrt{3} = \pm 1,732$
 $z_2 = 4 \Rightarrow x_{3/4} = \pm\sqrt{4} = \pm 2$
- e) $z = x^2, 0 = z^2 - 3z + 2,5;$
 $p = -3, q = 2,5$
keine Lösung
- g) $z = x^2, 0 = -2z^2 + 17z - 28,125;$
 $p = -8,5, q = 14,0625$
 $z_1 = -1,418 \Rightarrow$ keine Lösung
 $z_2 = 9,918 \Rightarrow x_{1/2} = \pm\sqrt{9,918} = \pm 3,149$
- i) $z = z^2, 0 = 3z^2 + 47,25z - 12;$
 $p = 15,75, q = -4$
 $z_1 = -16 \Rightarrow$ keine Lösung
 $z_2 = 0,25 \Rightarrow x_{1/2} = \pm\sqrt{0,25} = \pm 0,5$
- k) $z = x^2, 0 = -4x^4 - 183,75x^2 - 4624;$
 $p = 45,9375, q = 1156$
keine Lösung
2. a) $z = x^3, 0 = 0,5x^6 + 9,5x^3 - 216;$
 $p = 19, q = -216$
 $z_1 = -27 \Rightarrow x_1 = \sqrt[3]{-27} = -3$
 $z_2 = 8 \Rightarrow x_2 = \sqrt[3]{8} = 2$
- c) $z = x^4, 0 = -4x^8 + 68x^4 - 64;$
 $p = -17, q = 16$
 $z_1 = 0,16 \Rightarrow x_{1/2} = \pm\sqrt[4]{0,16} = \pm 2$
 $z_2 = 0,49 \Rightarrow x_{3/4} = \pm\sqrt[4]{0,49} = \pm 0,837$
- b) $z = x^2, 0 = z^2 + 3z - 10; p = 3, q = -10$
 $z_1 = -5 \Rightarrow$ keine Lösung
 $z_2 = 2 \Rightarrow x_{1/2} = \pm\sqrt{2} \approx \pm 1,414$
- d) $z = x^2, 0 = -0,5z^2 + 2z + 6;$
 $p = -4, q = -12$
 $z_1 = -2 \Rightarrow$ keine Lösung
 $z_2 = 6 \Rightarrow x_{1/2} = \pm\sqrt{6} = \pm 2,449$
- f) $z = x^2, 0 = 0,2z^2 - z - 1,2;$
 $p = -5, q = -6$
 $z_1 = -1 \Rightarrow$ keine Lösung
 $z_2 = 6 \Rightarrow x_{3/4} = \pm\sqrt{6} = \pm 2,449$
- h) $z = x^2, 0 = 3z^2 - 26,75z - 6,75;$
 $p = -8,917, q = -2,25$
 $z_1 = -0,246 \Rightarrow$ keine Lösung
 $z_2 = 9,163 \Rightarrow x_{1/2} = \pm\sqrt{9,163} = \pm 3,027$
- j) $z = z^2, 0 = -5x^4 + 3,25x^2 - 0,392;$
 $p = -0,65, q = 0,0784$
 $z_1 = 0,16 \Rightarrow x_{1/2} = \pm\sqrt{0,16} = \pm 0,4$
 $z_2 = 0,49 \Rightarrow x_{3/4} = \pm\sqrt{0,49} = \pm 0,7$
- l) $z = x^2, 0 = 0,8x^4 - 10,512x^2 + 19,602;$
 $p = -13,14, q = 24,5025$
 $z_1 = -10,89 \Rightarrow$ keine Lösung
 $z_2 = -2,25 \Rightarrow$ keine Lösung
- b) $z = x^3, 0 = -0,3x^6 - 18,9x^3 + 19,2;$
 $p = 63, q = -64$
 $z_1 = -64 \Rightarrow x_1 = \sqrt[3]{-64} = -4$
 $z_2 = 1 \Rightarrow x_2 = \sqrt[3]{1} = 1$
- d) $z = x^2, 0 = -0,1x^4 - 3,4x^2 - 22,5;$
 $p = 34, q = 225$
 $z_1 = -25 \Rightarrow$ keine Lösung
 $z_2 = -9 \Rightarrow$ keine Lösung

e) $z = x^3, 0 = 0,01x^6 + 1,33x^3 + 10;$
 $p = 133, q = 1000$

$$z_1 = -125 \Rightarrow x_1 = \sqrt[3]{-125} = -5$$

$$z_2 = -8 \Rightarrow x_2 = \sqrt[3]{-8} = -2$$

g) $z = x^3, 0 = -0,02x^6 - 3,78x^3 - 160;$
 $p = 189, q = 8000$

$$z_1 = -125 \Rightarrow x_1 = \sqrt[3]{-125} = -5$$

$$z_2 = -64 \Rightarrow x_2 = \sqrt[3]{-64} = -4$$

i) $z = x^4, 0 = -0,01x^8 + 6,26x^4 - 6,25;$
 $p = -626, q = 625$

$$z_1 = 1 \Rightarrow x_{1/2} = \pm \sqrt[4]{1} = \pm 1$$

$$z_2 = 625 \Rightarrow x_{3/4} = \pm \sqrt[4]{625} = \pm 5$$

f) $z = x^5, 0 = 0,1x^{10} - 3,3x^5 + 3,2;$
 $p = -33, q = 32$

$$z_1 = 1 \Rightarrow x_1 = \sqrt[5]{1} = 1$$

$$z_2 = 32 \Rightarrow x_2 = \sqrt[5]{32} = 2$$

h) $z = x^6, 0 = 0,1x^{12} - 72,8x^6 - 72,9;$
 $p = -728, q = -729$

$$z_1 = -1 \Rightarrow \text{keine Lösung}$$

$$z_2 = 729 \Rightarrow x_{3/4} = \sqrt[6]{729} = \pm 3$$

j) $z = x^2, 0 = -1,5x^4 - 8,25x^2 - 11,25;$
 $p = 5,5, q = 7,5$

$$z_1 = - \Rightarrow \text{keine Lösung}$$

$$z_2 = -2,5 \Rightarrow \text{keine Lösung}$$