

Aufgabe 1

a)

$$(x - 2)(x + 5) = 0$$

$$x_1 = 2$$

$$x_2 = -5$$

b)

$$x^3 - 4x = 0$$

$$x(x^2 - 4) = 0$$

$$x(x - 2)(x + 2) = 0$$

$$x_1 = 0$$

$$x_2 = 2$$

$$x_3 = -2$$

c)

$$(x + 1)^2(x - 3)^2 = 0$$

$$x_1 = -1$$

$$x_2 = 3$$

d)

$$(x^2 + x)(x - 10) = 0$$

$$x(x + 1)(x - 10) = 0$$

$$x_1 = 0$$

$$x_2 = -1$$

$$x_3 = 10$$

e)

$$\begin{aligned}(x^2 - 6x + 9)(x^2 - 4) &= 0 \\(x - 3)^2(x - 2)(x + 2) &= 0 \\x_1 &= 3 \\x_2 &= 2 \\x_3 &= -2\end{aligned}$$

f)

$$\begin{aligned}(x^3 - 4x^2 + 4x)(2x - 3) &= 0 \\x(x^2 - 4x + 4)(2x - 3) &= 0 \\x(x - 2)^2(2x - 3) &= 0 \\x_1 &= 0 \\x_2 &= 2 \\2x - 3 &= 0 \\2x &= 3 \\x_3 &= \frac{3}{2} = 1,5\end{aligned}$$

g)

$$\begin{aligned}(x - 7)(x^2 + 3x) &= 0 \\(x - 7)(x + 3)x &= 0 \\x_1 &= 7 \\x_2 &= -3 \\x_3 &= 0\end{aligned}$$

h)

$$\begin{aligned}x^5 + 4x^4 &= 0 \\x^4(x + 4) &= 0 \\x_1 &= 0 \\x_2 &= -4\end{aligned}$$

h)

$$\begin{aligned}(x^4 - 3x^3)(x + 4)^2 &= 0 \\x^3(x - 3)(x + 4)^2 &= 0 \\x_1 &= 0 \\x_2 &= 3 \\x_3 &= -4\end{aligned}$$

Aufgabe 2

Ansatz: $f(x) = 0$

a)

$$\begin{aligned}(x + 3)(x - 5)(x + 7)^2 &= 0 \\x_1 &= -3 \\x_2 &= 5 \\x_3 &= -7\end{aligned}$$

b)

$$(x - 1)(x^2 + 2x - 8) = 0$$

$$x_1 = 1$$

$$x^2 + 2x - 8 = 0$$

$$x_{2,3} = -\frac{2}{2} \pm \sqrt{\left(\frac{2}{2}\right)^2 + 8}$$

$$= -1 \pm \sqrt{9}$$

$$x_2 = -1 + 3 = 2$$

$$x_3 = -1 - 3 = -4$$

c)

$$x^3 - 41x^2 + 400x = 0$$

$$x(x^2 - 41x + 400) = 0$$

$$x_1 = 0$$

$$x^2 - 41x + 400 = 0$$

$$x_{2,3} = -\frac{-41}{2} \pm \sqrt{\left(\frac{41}{2}\right)^2 - 400}$$

$$= 20,5 \pm \sqrt{420,25 - 400}$$

$$= 20,5 \pm \sqrt{20,25}$$

$$x_2 = 20,5 + 2,5 = 23$$

$$x_3 = 20,5 - 2,5 = 18$$

d)

$$(x^2 - 9)(x^2 + 8x + 16) = 0$$

$$(x + 3)(x - 3)(x + 4)^2 = 0$$

$$x_1 = -3$$

$$x_2 = 3$$

$$x_3 = -4$$

e)

$$(x - 5)^3(x + 5)(x - 9) = 0$$

$$x_1 = 5$$

$$x_2 = -5$$

$$x_3 = 9$$

f)

$$2x^5 + 8x^4 = 0$$

$$x^4(2x + 8) = 0$$

$$x_1 = 0$$

$$2x + 8 = 0$$

$$2x = -8$$

$$x_3 = -4$$