

Lösungssatz S. 11 MVE 335  
100812

1) a)  $x^2 - 4^2 = 6^2$ ,  $x^2 = 20$ ,  $x = \sqrt{20} = 2\sqrt{5}$    
 b)  $A = 4 \cdot x \cdot \frac{1}{2} = 4\sqrt{5}$   
 c)  $\cos \alpha = \frac{4}{6} = \frac{2}{3}$ ,  $\alpha = \arccos \frac{2}{3} \approx 48^\circ$   
 $\beta = 90^\circ - 48^\circ = 42^\circ$

2) a)  $x = -(-\frac{3}{2}) \pm \sqrt{(\frac{3}{2})^2 + 7} = 3 \pm \sqrt{16} = 3 \pm 4$ ,  $x_1 = 7$ ,  $x_2 = -1$

b)  $x^2 - 6x - 7 = (x-7)(x+1)$  DWS

$2x^2 - 12x - 14 = 2(x-7)(x+1)$

c) Quadratkompletieren:

$x^2 - 6x - 7 = (x-3)^2 - 16 \geq -16$

3) a)  $(\frac{a^2}{b} - \frac{b}{a^2})^2 = (\frac{b}{a^2})^2 (a^2 b)^2 = \frac{b^4 b^2}{a^8} = \frac{b^6}{a^8}$

b)  $\frac{a^3 - 4ab^2}{a^2 - 2ab} = \frac{a(a^2 - 4b^2)}{a(a-2b)} = \frac{(a-2b)(a+2b)}{a-2b} = a+2b$

4) Cosinussatz:

$x^2 = 3^2 + 4^2 - 2 \cdot 3 \cdot 4 \cos 20^\circ$   
 $x = \sqrt{25 - 24 \cos 20^\circ} \approx 1,56$

$\frac{\sin B}{3} = \frac{\sin 20}{1,56}$ ,  $B = \arcsin(\frac{3 \sin 20}{1,56}) \approx 41^\circ$   
 $C \approx 180^\circ - 20^\circ - 41^\circ = 119^\circ$



5) a)  $z_1 + z_2 = (2-5i) + (-1-3i) = 1-8i$

b)  $|z_1| = \sqrt{2^2 + (-5)^2} = \sqrt{29}$ ,  $|z_2| = \sqrt{(-1)^2 + (-3)^2} = \sqrt{10}$

$|z_1 z_2| = |z_1| |z_2| = \sqrt{29} \sqrt{10} = \sqrt{290}$

$|z_1 / z_2| = \frac{|z_1|}{|z_2|} = \frac{\sqrt{29}}{\sqrt{10}} = \sqrt{2,9}$

6)  $u+v = (2, -5) + (-1, 3) = (1, -2) = w$

$u-v = (2, -5) - (-1, 3) = (3, -8) = t$

$u \cdot v = |a||b| \cos \alpha$   $q \in \mathbb{R}$

$(1, -2) \cdot (3, -8) = \sqrt{1+4} \sqrt{9+64} \cos \alpha$

$3+16 = \sqrt{5} \sqrt{73} \cos \alpha$

$\alpha = \arccos \frac{19}{\sqrt{5 \cdot 73}} \approx 60^\circ$

7) a)  $q^x - 3^{x+2} = 0 \Leftrightarrow (3^2)^x - 3^{x+2} = 0 \Leftrightarrow$

$(3^x)^2 - 9 \cdot 3^x = 0 \Leftrightarrow 3^x(3^x - 9) = 0$

$\Leftrightarrow 3^x - 9 = 0 \Leftrightarrow x = 2$

b)  $\lg(x+1) + \lg(x-1) = 2 \lg x - \lg 2 \Leftrightarrow \begin{bmatrix} 0 & u \\ x > 1 \end{bmatrix} \Leftrightarrow$

$\lg(x+1)(x-1) = \lg \frac{x^2}{2} \Leftrightarrow$

$x^2 - 1 = \frac{x^2}{2} \Leftrightarrow x^2 = 2$ ,  $x = (\pm)\sqrt{2}$   $x = \sqrt{2}$

8)

SeH  $w = z^3$ :  $w^2 - 7w - 8 = 0$

$w = \frac{7}{2} \pm \sqrt{\frac{49}{4} + \frac{32}{1}} = \frac{7}{2} \pm \frac{9}{2}$ ,  $w_1 = 8$ ,  $w_2 = -1$

1)  $z^3 = 8$ ,  $|rc^3| = 8 \Rightarrow r = 2$

$r = 2$ ,  $3\theta = n \cdot 2\pi$ ,  $\theta = n \cdot \frac{2\pi}{3}$ ,  $n = 0, 1, 2$

2)  $z^3 = -1$ ,  $|rc^3| = 1 \Rightarrow r = 1$

$r = 1$ ,  $3\theta = \pi + n \cdot 2\pi$ ,  $\theta = \frac{\pi}{3} + n \cdot \frac{2\pi}{3}$ ,  $n = 0, 1, 2$

