

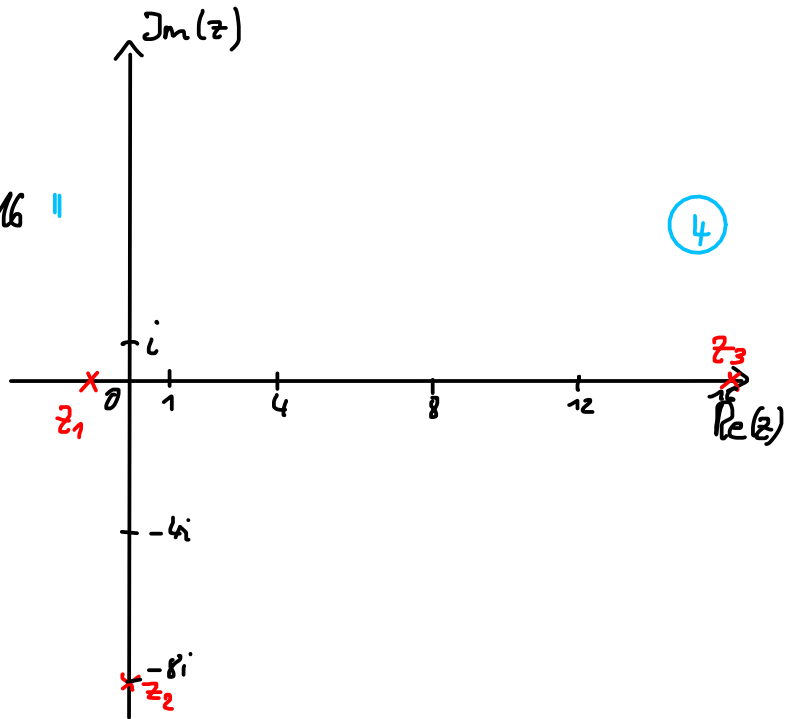
1. $z_1 = (-i)^2 = -1$

$z_2 = (2 \cdot e^{i \cdot \frac{\pi}{2}})^3 = 8 \cdot e^{i \cdot \frac{3\pi}{2}} = -8i$

$z_3 = (1+i)^8 = (\sqrt{2} e^{i \cdot \frac{\pi}{4}})^8 = 16 \cdot e^{i \cdot 2\pi} = 16$

2. $z_1 = 2-2i = 2\sqrt{2} \cdot e^{i \cdot \frac{7\pi}{4}}$
 $= 2\sqrt{2} \cdot (\cos \frac{7\pi}{4} + i \cdot \sin \frac{7\pi}{4})$

$z_2 = 4 \cdot e^{\frac{\pi}{6} \cdot i}$
 $= 4 \cdot (\cos \frac{\pi}{6} + i \cdot \sin \frac{\pi}{6})$
 $= 4 \cdot (\frac{1}{2} \sqrt{3} + i \cdot \frac{1}{2})$
 $= 2\sqrt{3} + 2i$



3. $z_1 = 3-5i$; $z_2 = -1+2i$

a) $\bar{z}_1 = 3+5i$ — b) $z_1+z_2 = 2-3i$ — c) $z_1-z_2 = 4-7i$ —

d) $z_1 \cdot z_2 = (3-5i) \cdot (-1+2i) = -3+6i+5i-10i^2 = 7+11i$

e) $\frac{1}{z_1} = \frac{1 \cdot (3+5i)}{(3-5i) \cdot (3+5i)} = \frac{3+5i}{9+25} = \frac{3}{34} + \frac{5}{34}i$

f) $\frac{z_1}{z_2} = \frac{(3-5i)(-1-2i)}{(-1+2i)(-1-2i)} = \frac{-3-6i+5i-10}{1+4} = -\frac{13}{5} - \frac{1}{5}i$

4. $z = a+bi$

$\bar{z} = a-bi$

$\bar{z}^2 = (a-bi)^2 = a^2 - 2abi - b^2$

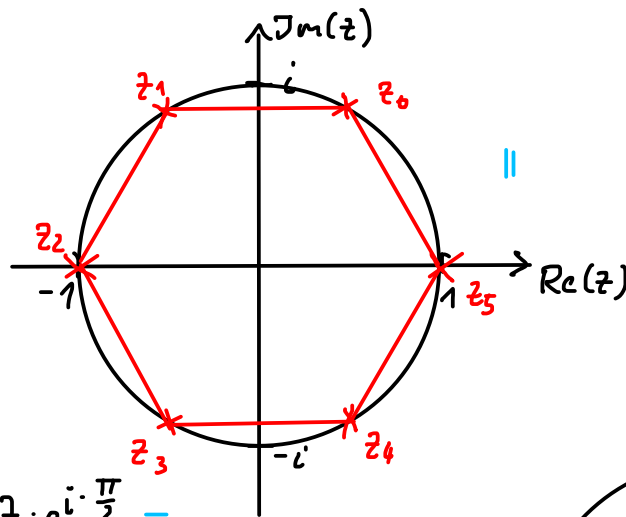
$z^2 = (a+bi)^2 = a^2 + 2abi - b^2$

$\bar{z}^2 = a^2 - b^2 - 2abi$

sind gleich!

□

5. a) $z^6 = 1$

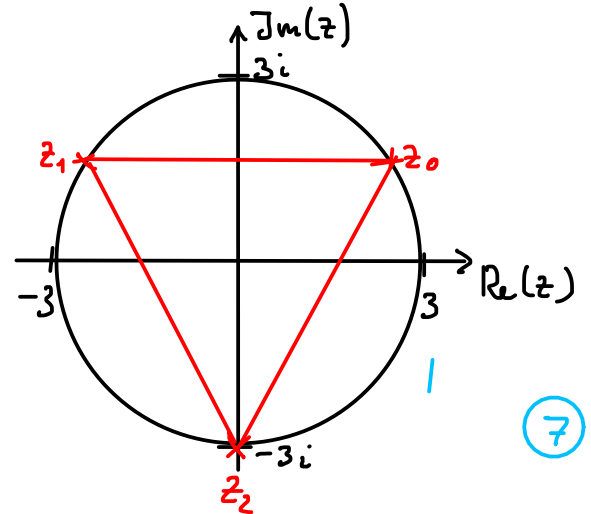


b) $z^3 = 27i = 27 \cdot e^{i \cdot \frac{\pi}{2}}$ —

$z_0 = 3 \cdot e^{i \cdot \frac{\pi}{6}}$ |

$z_1 = 3 \cdot e^{i \cdot (\frac{\pi}{6} + \frac{2\pi}{3})} = 3 \cdot e^{i \cdot \frac{5\pi}{6}}$ |

$z_2 = 3 \cdot e^{i \cdot (\frac{\pi}{6} + \frac{4\pi}{3})} = 3 \cdot e^{i \cdot \frac{3\pi}{2}} = -3i$ |—



6. a) $\int_0^{\frac{1}{\sqrt{3}}} \frac{-6x}{2-3x^2} dx$
 $= \left[\ln |2-3x^2| \right]_0^{\frac{1}{\sqrt{3}}}$ |—

mit $f(x) = 2-3x^2$
 $f'(x) = -6x$

$= \ln |2-3 \cdot \frac{1}{3}| - \ln |2-0| = \ln 1 - \ln 2 = \underline{\underline{-\ln 2}}$ |

b) $\int_2^4 \frac{4x+4}{\sqrt{x^2+2x+1}} dx$
 $= \int_9^{25} \frac{2}{\sqrt{z}} dz = \int_9^{25} 2 \cdot z^{-\frac{1}{2}} dz$
 $= \left[2 \cdot \frac{1}{\frac{1}{2}} z^{\frac{1}{2}} \right]_9^{25}$ |
 $= 4 \cdot 5 - 4 \cdot 3$
 $= \underline{\underline{8}}$ —

Subst: $z = x^2 + 2x + 1$

$\frac{dz}{dx} = 2x + 2$ — | $\cdot dx \cdot 2$

$2 dz = (4x + 4) dx$ —

Grenzen:

$x_1 = 2 : z_1 = 4 + 4 + 1 = 9$ —

$x_2 = 4 : z_2 = 16 + 8 + 1 = 25$ —

$$7. \quad \underbrace{\sqrt{4x-12}}_{\geq 0} \geq \underbrace{1+\sqrt{2x-5}}_{\geq 0} \quad |(\dots)^2 \quad D=\underline{[3; +\infty)} \quad |$$

$$4x-12 \geq 1+2\sqrt{2x-5}+2x-5 \quad | -2x+4$$

$$2x-8 \geq 2\sqrt{2x-5} \quad | :2$$

$$\underbrace{x-4}_{\geq 0 \text{ für } x \geq 4} \geq \underbrace{\sqrt{2x-5}}_{\geq 0} \quad |(\dots)^2$$

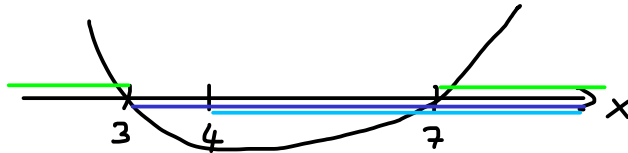
$$x^2-8x+16 \geq 2x-5 \quad | -2x+5$$

$$\underline{x^2-10x+21 \geq 0} \quad |$$

Nullstellen bei Gleichheit:

$$x_{1/2} = \frac{+10 \pm \sqrt{100-84}}{2} = \frac{10 \pm 4}{2}$$

$$x_1 = 7, x_2 = 3 \quad |$$



$$\underline{\underline{L = [7; +\infty)}} \quad |$$

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