Solution PS_05

9/c

$z = 1 - \sqrt{3}\,i \quad ; \quad |z| = \sqrt{1^2 + \sqrt{3}^2} = 2$

$$\left.\begin{aligned} \cos\varphi &= \frac{1}{2} \\ \sin\varphi &= -\frac{\sqrt{3}}{2} \end{aligned}\right\} \quad \varphi = 300° = \frac{5\pi}{3}$$

$w^6 = z$

$$\boxed{w = \sqrt[6]{2} \cdot \left(\cos\left(50° + 60°\cdot k\right) + i \cdot \sin\left(50° + 60°\cdot k\right)\right) \quad ; \quad k = 0, \ldots, 5}$$

l.g.

$$\begin{cases} w_1 = \sqrt[6]{2}\,(\cos 50° + i\cdot\sin 50°) \\ w_2 = \sqrt[6]{2}\,(\cos 110° + i\cdot\sin 110°) \\ \vdots \\ w_6 = \sqrt[6]{2}\,(\cos 350° + i\cdot\sin 350°) \end{cases}$$

9/d

$z = -7\sqrt{3} + 7i \quad ; \quad |z| = \sqrt{3\cdot 49 + 49} = 14$

$$\left.\begin{aligned} \cos\varphi &= -\frac{\sqrt{3}}{2} \\ \sin\varphi &= \frac{1}{2} \end{aligned}\right\} \quad \varphi = 150° = \frac{5\pi}{6}$$

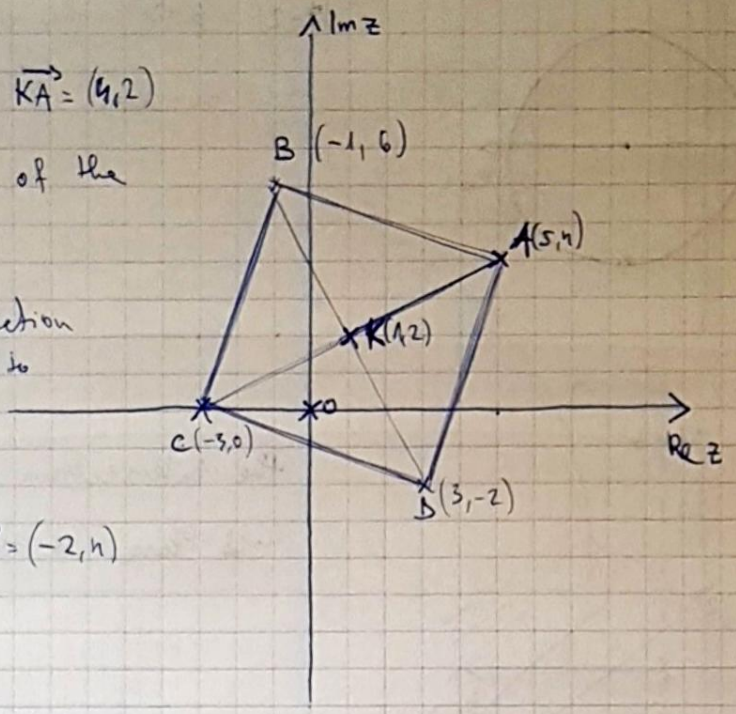
$w^5 = z$

$$\boxed{w = \sqrt[5]{14}\left(\cos\left(\frac{\pi}{6} + \frac{2\pi}{5}\cdot k\right) + i\cdot\sin\left(\frac{\pi}{6} + \frac{2\pi}{5}\cdot k\right)\right) \quad ; \quad k = 0, \ldots, 4}$$

Solutions PS_06

2.)

- direction vector $\vec{KA} = (4,2)$
- K is the center of the square
- rotate the direction vector by 90° to get the vertices of the square



$\vec{KA} = (4,2) \Rightarrow \vec{KB} = (-2,4)$

$\Rightarrow \vec{KC} = (-4,-2)$

$\Rightarrow \vec{KD} = (2,-4)$

- $\vec{OB} = \vec{OK} + \vec{KB} = (-1,6)$
- $\vec{OC} = \vec{OK} + \vec{KC} = (-3,0)$
- $\vec{OD} = \vec{OK} + \vec{KD} = (3,-2)$

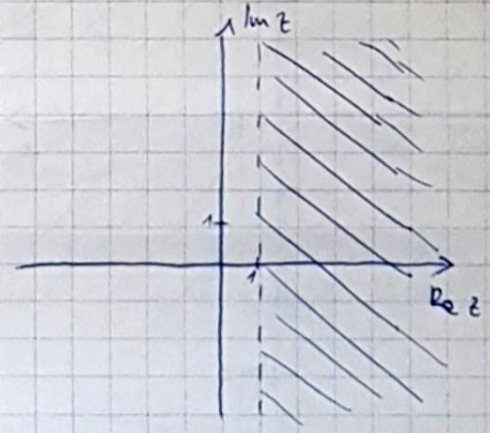
5.)

$A = \{z \in \mathbb{C} \mid \operatorname{Re} z > 1\}$

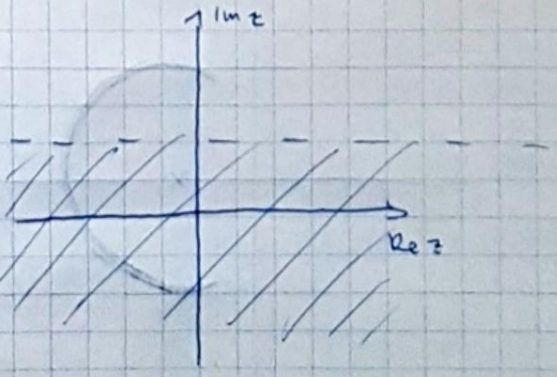
$B = \{z \in \mathbb{C} \mid \operatorname{Im} z < 2\}$

$C = \{z \in \mathbb{C} \mid |z-2| = 3\}$

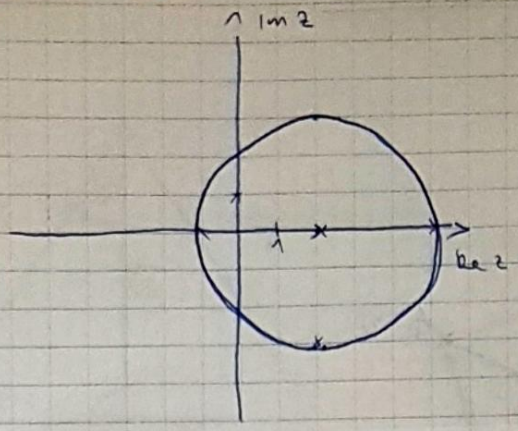
a)



b)

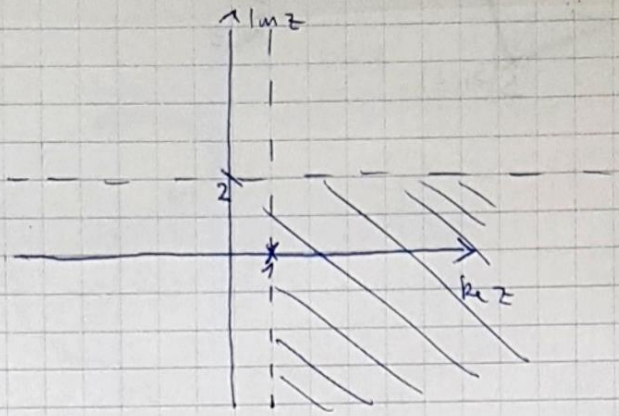


c.)



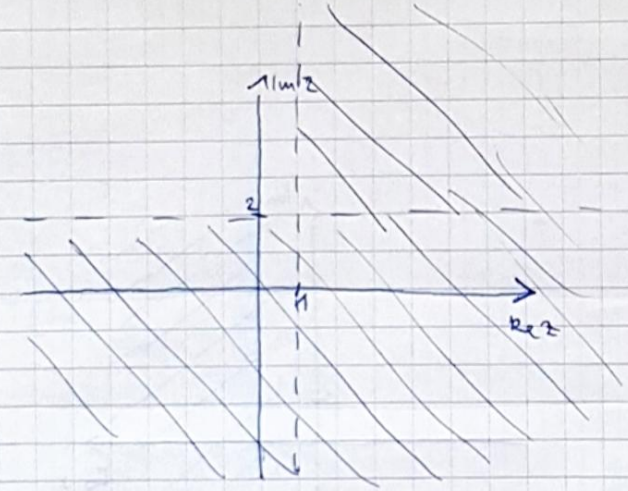
$|z-2| = 3 \Rightarrow$ the distance from the number „2" is 3

e.)

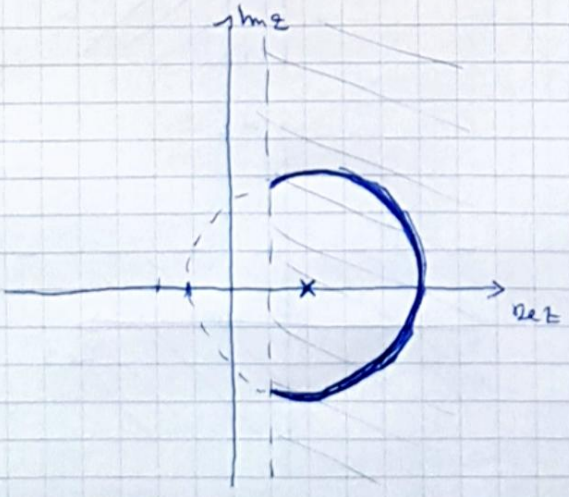


the intersection of the two half-Plane is this quadrant

f.)



g.)

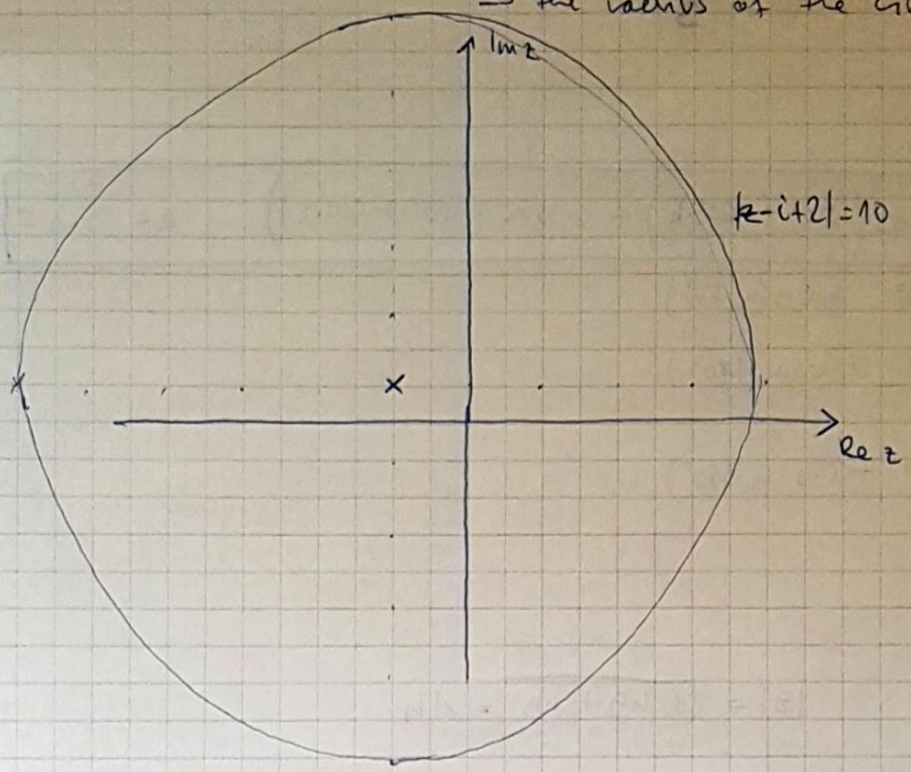


6.)

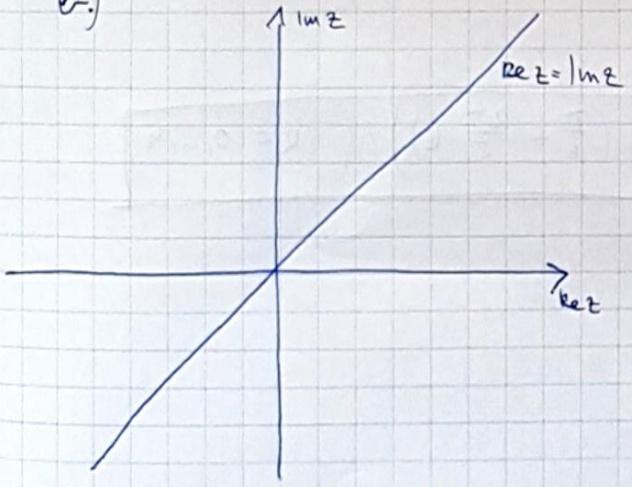
a.) $\{z \in \mathbb{C} \mid |z - i + 2| = 10\}$

$\Rightarrow |z - (-2+i)| = 10 \Rightarrow$ the center of the circle is at point $(-2,1)$

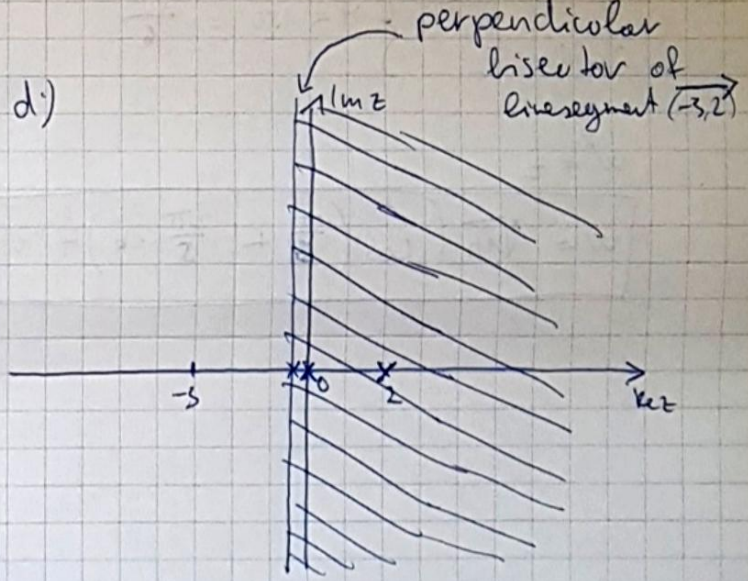
$\Rightarrow$ the radius of the circle is 10



b.)



d.)



$|z-2| \leq |z+3| \Rightarrow$ „the distance from the complex number 2 is less than equal to the distance from the complex number -3."