

1.

$$(\sqrt{3} + i)^{-2} =$$

2.

$$[2(\cos 42^\circ + i \sin 42^\circ)]^5 =$$

3.

$$\sqrt{\frac{\sqrt{3}}{2} - \frac{1}{2}i} =$$

4.

$$z = -4i \implies z^{\frac{1}{2}} =$$

5.

$$\frac{\cos 309^\circ + i \sin 309^\circ}{\cos 129^\circ + i \sin 129^\circ} =$$

6.

$$z = (1 + i)\bar{z} + 3 - 8i \implies z =$$

7.

$$w = \cos 40^\circ + i \sin 40^\circ \implies (w + 2w + 3w + \dots + 9w)^{-1} =$$

8.

$$z = (1 + i\sqrt{3})^{245} \implies \arg(z) =$$

9.

$$\left[ \frac{1 + i + \sqrt{3}(1 - i)}{1 + i} \right]^3 =$$

10.

$$z = 1 - i\sqrt{3} \implies \text{In Polarform: } z =$$

11.

$$z = (\sqrt{2} - \sqrt{2}i)^4 \implies \arg(z) =$$

12.

$$\sqrt{-8}\sqrt{-2} =$$

13.

$$z^4 + 1 = 0 \implies z =$$

14.

$$p(z) = z^3 - z + 1 \implies p(1 - i) =$$

15.

$$x^2 + x + 1 = 0 \implies x =$$

16.

$$z_1 = 3 - 2i \wedge z_2 = 3 - i \implies \frac{z_1}{z_2} =$$

17.

$$z_1 = 2i \wedge z_2 = 2 + i \implies \Re(z_1 \cdot z_2) =$$

18.

$$\frac{3 - 2i}{2 + 3i} =$$

19. Welche Beziehung ist im allgemeinen für  $a, b \in \mathbb{R}$  **nicht** richtig?

a)

$$(\sqrt{a})^2 = a$$

b)

$$|a \cdot b| = |a| \cdot |b|$$

c)

$$|a + b| \leq |a| + |b|$$

d)

$$\sqrt{a^2} = |a|$$

e)

$$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$

20. Vier komplexe Zahlen bilden ein Quadrat. Drei davon sind  $1 + 2i$ ,  $-2 + i$  und  $-1 - 2i$ . Bestimme die vierte Zahl.

21.

$$(1 + i)^{20} - (1 - i)^{20} =$$

22.

$$x = \frac{1 - i\sqrt{3}}{2} \implies \frac{1}{x^2 - x} =$$

23.

$$z = \frac{1}{4 - 3i} \implies \Im(\bar{z}) =$$

24.

$$n \in \mathbb{N}^+ \wedge i^2 = -1 \implies \frac{2}{i^{8n-34}} + \frac{3}{i^{12n-26}} =$$

25.

$$\frac{1}{1+i} + a + bi = 1 - i \implies a + b =$$

26.

$$\left(\frac{1+i}{1-i}\right)^{11} - 3\left(\frac{1-i}{1+i}\right)^{33} =$$

27.

$$z = i + \sqrt{3} \implies \text{In Polarform: } z =$$

28.

$$z = 3\sqrt{3} - 3i \implies z^6 =$$

29.

$$(4 + \sqrt{-9}) \cdot (3 - 2\sqrt{-4}) =$$

30.

$$\frac{(1 - i\sqrt{3})^3}{(-2 + 2i)^4} =$$