1. Löse in $\mathbb{C}$:

   (a) $\frac{3}{2}z^2 + 6z + \frac{34}{3} = 0$

   (b) $z^2 - 11z + 37 = 0$

   (c) $z^2 - 4z + 9 = 0$

   (d) $4z^2 + 24z + 99 = 0$

2. Gib Definitions und Lösungsmenge an!

   (a) $\frac{z-1}{z+2} + \frac{z-3}{z-2} = \frac{z^2+6z-33}{z^2-4}$

   (b) $\frac{10}{z-2} - \frac{4}{z+1} = -6$

   (c) $\frac{1}{8-z} - \frac{1}{8+z} = \frac{z^2+3}{64-z^2}$

3. Stelle in Polarform dar:

   (a) $z_1 = 4i$

   (b) $z_2 = -3$

   (c) $z_3 = +5$

   (d) $z_4 = -2i$

   (e) $z_5 = -3 + 4i$

   (f) $z_6 = 4 - 5i$

   (g) $z_7 = 2 + 4i$

   (h) $z_8 = -5 - 3i$

4. Gib in Normalform an: $(\sqrt{5}; 315°)$

5. Vereinfache in Normalform!

   (a) $\frac{(5-5i)^2}{4-2i}$

   (b) $\frac{(1+i)^3}{(1-i)^2}$

6. Berechne in Normalform und gib das Ergebnis in Polarform an:

   (a) $\frac{(-7+4i)+(4-i)^2}{(2-2i)}$

   (b) $\frac{10}{3+i}$

   (c) $\frac{5+4i}{(3-i)i}$

7. Vereinfache:

   (a) $(i^9 - i^6)^2 =$

   (b) $\frac{1}{i^3} + i^3 =$

   (c) $(i^{10} - i^7) =$

8. Vereinfache:

   (a) $\frac{3i}{4i^3} =$

   (b) $\frac{5b^2}{-bi} =$

   (c) $\frac{i^2}{(-i)^2} =$

9. Beschreibe die Menge aller $z \in \mathbb{C}$, für die gilt:

   (a) $|z| = 4$

   (b) $|z - 2| = 1$

   (c) $|z| \geq 2$

   (d) $|z| < 3,5$

   (e) $|z + 1| \geq 2$

   (f) $|z - 4| < 3$

LÖSUNGEN:

1. (a) $L = \{-2 - \frac{4\sqrt{2}}{3}i, -2 + \frac{4\sqrt{2}}{3}i\}$

   (b) $L = \{\frac{11}{2} - \frac{3\sqrt{3}}{2}i, \frac{11}{2} + \frac{3\sqrt{3}}{2}i\}$

   (c) $L = \{2 \pm \sqrt{5}i\}$

   (d) $L = \{-3 \pm \frac{3}{2}\sqrt{7}i\}$

2. (a) $D = \mathbb{C}\backslash\{\pm 2\}, L = \{5 \pm 2i\}$

   (b) $D = \mathbb{C}\backslash\{-1; 2\}, L = \{\pm i\}$

   (c) $D = \mathbb{C}\backslash\{\pm 8\}, L = \{1 \pm \sqrt{2}i\}$

3. (a) $z_1 = (4; 90°)$ (d) $z_4 = (2; 270°)$ (g) $z_7 = (\sqrt{20}; 63.43°)$

   (b) $z_2 = (3; 180°)$ (e) $z_5 = (5; 126, 9°)$

   (c) $z_3 = (5; 0°)$ (f) $z_6 = (\sqrt{41}; 308, 7°)$ (h) $z_8 = (\sqrt{34}; 210, 96°)$

4. $1, 58 + (-1, 58)i$

5. (a) $(5 - 10i)$ (b) $(-1 - i)$

6. (a) $(3 + i) = (\sqrt{10}; 18, 43°)$ (c) $(\frac{17}{10} - \frac{11}{10}i) = (2, 02; 327°)$

   (b) $(3 - i) = (\sqrt{10}; 341, 565°)$

7. (a) $2i$ (b) 0 (c) $-1 + i$

8. (a) $-\frac{3}{4}$ (b) $5bi$ (c) 1