

Problems 2

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For reference use: S. Osowski, K. Siwek, M. Smialek, Teoria obwodow, OWPW 2013, ISBN: 978-83-7207-577-2.

1) Find real part, imaginary part, absolute value and argument of:

$$\text{a) } i^{137}, \quad \text{b) } (2 + 8i)(i - 3), \quad \text{c) } \frac{(1 - i)}{(2 + i)^2} \quad \text{d) } \frac{5 - i}{2 + i} + \frac{7 + 3i}{3 - 2i}.$$

2) Solve for x and y in complex domain:

$$\begin{aligned} \text{a) } x^2 + 9 = 0, \quad \text{b) } x^2 - 2x + 5 = 0, \\ \text{c) } x^2 - (2 - i)x - 1 + 5i = 0, \quad \text{d) } x + xy = -13 \text{ and } y - x = 5. \end{aligned}$$

3) Express in trigonometric form:

$$\text{a) } -\sqrt[3]{2}, \quad \text{b) } 5i, \quad \text{c) } 2 - i\sqrt{12}, \quad \text{d) } -2 + 2i.$$

4) Knowing that $z_1 = -2\sqrt{3} + 2i$, $z_2 = 8i$, $z_3 = -\sqrt{3} + i$ evaluate:

$$\begin{aligned} \text{a) } z_1 \cdot z_2, \quad \text{b) } z_1 \cdot \bar{z}_3, \quad \text{c) } \frac{z_2}{z_3}, \quad \text{d) } \frac{z_1}{z_3}, \\ \text{e) } z_1^{12}, \quad \text{f) } \sqrt{z_1} \cdot z_3^{-2}, \quad \text{g) } z_1^{z_3}, \quad \text{h) } \sqrt[3]{z_3} \end{aligned}$$

5) Find all solutions for w :

$$\text{a) } w^2 = 1, \quad \text{b) } w^2 = -1, \quad \text{c) } w^5 = 1, \quad \text{d) } w^2 = i, \quad \text{e) } w^3 = 3 - i, \quad \text{f) } w^2 = 7 - 24i.$$