KLUB NAUKOWY FENIX

Problems 2

2 October, 2020

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:

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

2) Solve for x and y in complex domain:

$$\text{a)}\ x^2+9=0, \qquad \text{b)}\ x^2-2x+5=0,$$

$$\text{c)}\ x^2-(2-i)x-1+5i=0, \qquad \text{d)}\ x+xy=-13 \text{ and } y-x=5.$$

3) Express in trigonometric form:

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

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

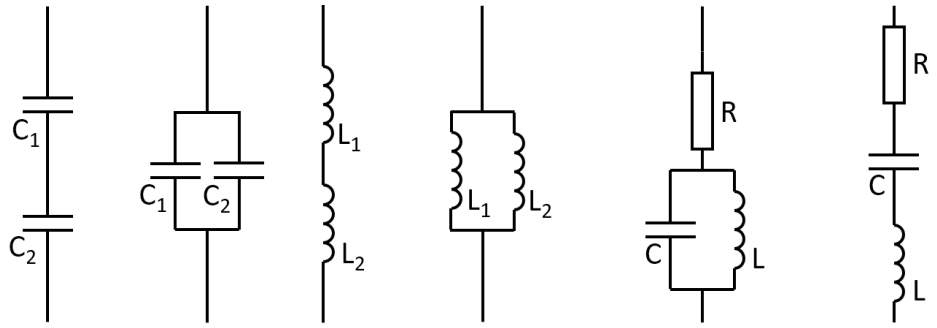
$$\text{a)}\ z_1\cdot z_2, \qquad \text{b)}\ z_1\cdot \bar{z_3}, \qquad \text{c)}\ \frac{z_2}{z_3}, \qquad \text{d)}\ \frac{z_1}{z_3},$$

$$\text{e)}\ z_1^{12}, \qquad \text{f)}\ \sqrt{z_1}\cdot z_3^{-2}, \qquad \text{g)}\ z_1^{z_3}, \qquad \text{h)}\ \sqrt[z_1]{z_3}$$

5) Find all solutions for w:

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

6) Find impedance of the electric circuits:



7) A sinusoidal voltage is applied to each circuits in problem 6. At what frequency ω the impedance of the circuits is the lowest?