SZÁMELMÉLET FELADATOK

KOMPLEX SZÁMOK

1. Find the order of the following numbers:
$1,\ -1,\ -i, 1+i,\ (1+i)/\sqrt{2},\ \cos(\sqrt{2}\pi)+i\sin(\sqrt{2}\pi),\ \cos 336^\circ + i\sin 33^\circ$

2. Find the 24th roots of unity and their orders.

3. Adjuk meg az $x^4+4=0, \quad x^6=1+i, \quad x^n=-1$ egyenletek összes megoldását.

4. Find the sum, product and the sum of the squares of the n-th roots of unity.

5. Prove that the product of an n-th and m-th root of unity is a mn-th root of unity. Prove that this product is a primitive nm-th root iff they are both primitive.

6. Multiply the 6-th roots of unity by the 4-th roots of unity. What do we obtain?

7. Find $(\cos 330^\circ + i\sin 330^\circ)^{2001}$and $(\cos 30^\circ + i\sin 60^\circ)^{2001}$

8. Find the algebraic form of $\sqrt{a+bi}$

9. Solve $x^2-(2+i)x+7i-1$

10. Írjuk föl trigonometrikus alakban: $1+i, \quad 1-i, \quad -1-i\sqrt{3}, \quad \sqrt{3}+i$

11. Find $\Phi_n(x)$ for $n=12, 72, 144, 100, p^2, p^n, 2p$.

12. Find the sum of the primitive roots of unity (use 5).

13. Find the sum of the primitive roots mod p (use 12).

14. Solve $x^4+2=8y^2$ among the integers.

15. Solve $x^4-x^3+x^2-x+1=3y^2$ among the integers.