Philadelphia University

Department of Basic Sciences

Exam 2 **Number Theory** **04–05–2010**

Solutions must be complete in order to receive full credit.

1. Compute $2^{5412} \% 3375$ with the help of Euler's theorem.
2. What is the definition of a primitive root modulo n? Find all the primitive roots modulo 13.
3. Solve the discrete logarithm problem $6^x \equiv -2 \pmod{11}$ using the primitive root $g = 2$.
4. The number 257 is prime. Given that $g^{128} \equiv -1 \pmod{257}$. Prove that g is a primitive root modulo 257.

–Amin Witno