Philadelphia University

Department of Basic Sciences

Exam 1 **Computational Number Theory** **11–11–2007**

1. Evaluate $13^{4503} \% 1250$ using only Euler's Theorem. Successive squaring algorithm is not allowed.
2. In RSA, suppose $n = 319 = 11 \times 29$ and $e = 19$, and the received secret message is $s = 66$. What is the intended message m?
3. In RSA, suppose $n = 17711$ and it is known that $\phi(n) = 17424$. Factor n using quadratic formula.
4. In RSA, suppose two companies are using $n_1 = 35369$ and $n_2 = 41003$, respectively. They are sharing a common prime factor. Factor both n_1 and n_2.
5. Write $n = 10t + u$. Prove that $7 \mid n$ if and only if $7 \mid t - 2u$.

–Amin Witno