Philadelphia University

Department of Basic Sciences

Exam 1 **Number Theory** **03–12–2017**

1. (3 points) Evaluate $\gcd(1248, 534)$ using the Euclidean algorithm.
2. (3 points) Find all integers x and y satisfying the linear equation $15x + 42y = 21$.
3. (3 points) Prove the theorem: If $d \mid mn$ and $\gcd(d, m) = 1$, then $d \mid n$.
4. (2 points) Use prime factorization to count the number of positive divisors of the number 14400.
5. (2 points) Factor the number 943 using Fermat factorization.
6. (3 points) Use Wilson's theorem to help compute $34\,!\,\%\,37$.
7. (4 points) Find the congruence class of x satisfying the system $\begin{cases} x \equiv 2 \pmod{10} \\ x \equiv 3 \pmod{9} \\ x \equiv 5 \pmod{7} \end{cases}$

–Amin Witno