Exam 1   **Number Theory**   **02–04–2018**

1. (4 points) Find all integers x, y satisfying the linear equation $1248x + 534y = 96$.

2. (2 points) Let $\gcd(a, b) = 1$. Prove that if $a \mid n$ and $b \mid n$, then $ab \mid n$.

3. (2 points) Find $\gcd(1512, 2016)$ by factorization using prime numbers.

4. (2 points) Prove that if a prime $p > 2$, then $p^2 \in [1]_8$.

5. (3 points) Factor the number 989 using Fermat factorization.

6. (3 points) Compute $226! \% 229$ using Wilson's theorem.

7. (4 points) Find the congruence class of x satisfying the system $\begin{cases} x \equiv 2 \pmod 5 \\ x \equiv 1 \pmod 9 \\ x \equiv 4 \pmod 7 \end{cases}$

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