

IT-Security Cryptography and Secure Communications

Exercise: Introduction to Number Theory

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1. Compute the result of $5^9 \bmod 7$ by hand. Don't use a calculator!
2. Which numbers are relative prime to 21?
3. Compute the $\gcd(1037, 768)$ using the Euclidean algorithm.
4. Determine the result of Euler's Totient function ϕ for the value 37. Don't look it up; just think about it.
5. Convince yourself that Fermat's (little) theorem holds. E.g., for the numbers: $a = 9, p = 7$.
6. Convince yourself that Euler's theorem holds. E.g., for the following values: $a=7$ and $n=9$.