
Quiz Set 4

For Quiz on Thursday, October 31

Work all of the following problems. A subset of the problems will be on Quiz 4 to be given October 31. Quizzes will be graded for correctness and clarity.

Unless otherwise stated, all problems can be found in the appropriate *Problems* section of the textbook (*Elementary Number Theory* by U. Dudley, 2nd Edition).

- Section 9 # 2, 4, 7, 14
- Use Euler's Theorem to find $2^{9999950} \pmod{441}$. Your final answer should be a least residue modulo 441.
- Prove that $\phi(n)$ is even for any integer $n > 2$. (*Hint*: Consider two cases: when n is a power of 2 and when n is not a power of 2.)
- Section 10 # 2, 14
- Graduate Students: Let m and n be positive integers which are relatively prime. Prove that

$$m^{\phi(n)} + n^{\phi(m)} \equiv 1 \pmod{mn}.$$