

Introduction to Number Theory (M328K)

Homework # 8

Fall 2025

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1. §6.1 # 10.
2. §6.1 # 14.
3. §6.1 # 18.
4. §6.1 # 22.
5. §6.1 # 28.

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6. §6.3 # 8.
 7. §6.3 # 10.
 8. §6.3 # 12 (parts **a**) and **b**.)
 9. Let $m \in \mathbb{N}$ be a positive integer such that

$$m = p^n q,$$

where $n, q \in \mathbb{N}$, p is prime, and $(p, q) = 1$. Prove the following.

- a)** $p^{n-1} \geq n$.
- b)** $m - \phi(m) \geq n$. (*Hint:* You can use a counting argument on U_m . Alternatively, you can use the properties of the ϕ function that are shown in §7.1.)
- c)** If a is an integer such that $p \mid a$, then

$$a^{m-\phi(m)} \equiv 0 \pmod{p^n}.$$

10. §6.3 # 22. (*Hint:* Use the previous problem, Euler's theorem and the CRT.)