

Reading Assignment: Rosen's text 6th Edition: sections 3.5-3.6 & 4.1-4.2 (or, 5th Edition: sections 2.4-2.5 & 3.3).

Problems:

1. 6th edition: Section 1.6, Exercise 28. (5th edition: Section 1.5, Exercise 40.)
2. Prove that if n is an integer then $n^2 \bmod 8$ is either 0, 1, or 4.
3. 6th edition: Section 3.4, Exercise 22. (5th edition: Section 2.4, Exercise 44.)
4. Compute the greatest common divisor for each of the following pairs of numbers.
 - (a) $2^2 \cdot 3^3 \cdot 5^5, 2^5 \cdot 3^3 \cdot 5^2$
 - (b) 1000, 625
 - (c) $20!, 127$
5. How many zeroes are there at the end of $100!$?
Hint: Think about the unique factorization of $100!$ into primes.
6. Prove that for any prime $p > 3$, either $p \equiv 1 \pmod{6}$ or $p \equiv 5 \pmod{6}$.
7. 6th edition: Section 3.5, Exercise 32. (5th edition: Section 2.4, Exercise 46.)
8. **Extra Credit:** Use the result of problem 2 above to show that the equation $3x^2 - 2y^2 = 69$ does not have any solution where both x and y are integers.
9. **Extra Credit:** Prove that if a positive integer n is not a perfect square then \sqrt{n} is irrational.