Congruences (1.7-1.14)

- Exercise 1.7. Apply the definition carefully.
  - Consider variations to the exercise: If $45 \equiv 9 \pmod{n}$, then what values could n possibly take?
  - A Special case: When is a number congruent to 0?
- Exercise 1.8. Again, apply the definition.
- Theorem 1.9.
- Theorem 1.10. Is the theorem also true as an "if and only if"? Why did the book not state it that way?
- Theorem 1.11. Pay attention to the note that follows it.
- Theorem 1.12.
  - Consider the special case of this theorem where $c = d$. State how that theorem would look like then prove it.
  - Can you use this special case to provide a proof of the general case?
- Theorem 1.13. Provide both a direct proof as well as a proof that uses theorem 1.12.
- Theorem 1.14. Here again consider the special case of the theorem, and how it may help prove the more general case.
- Consider the following question: If $ac \equiv bc \pmod{n}$, does it necessarily follow that $a \equiv b \pmod{n}$? How does this relate to previous work?
- Find ways to express in English all the above theorems, without having to resort to individual variable names.