

*Required exercises: From the text, Chapter 2 pp. 50–55.*

- *Exercises: #38–50 even, #92;*
- *PODASIPS: 1–3 below.*

1. For every integer  $n$ ,  $8 \mid n^2 - 1$ .
2. For every integer  $n$ ,  $n^2 - n + 41$  is prime.
3. For any sets  $A, B, C$ , we have  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ .

Here are a few notes and pointers that apply to **every** HW assignment.

- Make sure to show your reasoning for every problem, even if it is not a full-blown proof.
- Acknowledge anyone from whom you received significant help.
- In writing or presenting, it is usually good form to “tell them what you’re going to tell them (at the start), then tell them, then tell them what you told them (at the end)”.
- Make sure to indicate clearly the provenance of any symbols you use. By “ $a = bf$ ” do you mean for **some**  $f$  or for **every**  $f$ ? Is  $f$  supposed to be an integer or could it be rational? Or even a function written on the right? Quantifiers are very handy for this. Make sure if you introduce a function that you clarify its domain and co-domain.
- Make sure that every step in your **reasoning** is clear and sufficiently justified. It is generally fine, however, to condense computational or algebraic steps that the reader can fairly be assumed to easily check on his own. For example, you may rewrite

$$x^2 + 2x^2y - 4xy + y^2 - 2yx^2 - 7 = 0$$

as  $(x - y)^2 = 2xy + 7$  in one step.

- **Rule of Thumb:** Could one of your classmates follow your argument as written without you giving any additional information? Or might she ask you how you got from one step to another? In the latter case, you may want to explain things more carefully.
- Please write neatly, and leave enough space (e.g., in the margins) for comments.
- **PODASIP** stands for “Prove Or Disprove And Salvage If Possible”. To disprove a statement, give a counterexample. Then if you see a way to salvage the statement, somehow add an extra condition or tweak it to get a true statement, please do so. Generally proofs of good salvages will receive extra credit.
- **DAWYATTP** “Daw-we-at-up” stands for “Don’t Assume What You Are Trying to Prove.” It’s one of the most common issues that undergraduates have when they are learning to do proofs. Don’t be surprised if you see it written next to one of your proof attempts.