CMPU 240 · Spring 2026

Guide to Assignments

A goal for this course is for you to gain experience using models of computation, formal languages, and proofs to solve problems. The homework assignments are essential practice for you to think about the material outside of class and identify what you don't understand.

Working with a partner

Every homework assignment in CMPU 240 can be completed with a partner. This is a bit unusual, but there are many advantages to working on assignments with a partner!

- Your partner can serve as a sounding board for ideas as you're working through trickier problems.
- Having a partner can keep you accountable to make slow and steady progress on the assignment over the week, giving you more time to digest content and ask for help if you need it.
- Once you've written up an answer to a problem, your partner can read over your answer and offer feedback, and reading over your partner's answers will improve your own ability to critique proofs and other mathematical structures.

That said, some people feel most comfortable working on their own, and that's fine! We'll ask everyone to work with a partner for the first assignment (otherwise most people don't give it a try), but after that you're free to complete the assignments individually if you prefer.

How do I find a partner?

You can be bold and introduce yourself to the people around you in class or, if you prefer, you can post on the class discussion board to say you're looking for a partner.

Can I switch partners?

Yes! You are not required to work with the same partner all the time. Our only rule is that if you've started working on an assignment with someone, you need to submit that specific assignment jointly. But after the due date, you're free to switch who you're working with for the next assignment.

How should I work with my partner?

Let's start with what *not* to do:

- *Do not* have one person do all the work and the other person just attach their name at the end!

- *Do not* have one person do half the exercises and the other person do the other half.

  You're not likely to end up being good cooks if one of you just practices sautéing and the other just practices roasting. You're not likely to end up being good woodworkers if one of you just practices using a table saw an the other just practices using a miter saw. You're not likely to end up being good musicians if one of you just practices playing pieces in major scales and the other another just practices playing pieces in minor scales.

  Each exercise is calibrated to hit some particular nuance of the material, and if you don't work through *all* of them you'll miss some important skills and concepts.

- *Do not* take turns completing assignments. The material in CMPU 240 builds on itself, so if you take a week off from working on assignments, you can easily get yourself into a point where you can't get caught back up.

If you're submitting as a pair, we expect that *both* you and your partner actually did the work! Not doing so is academic dishonesty – and it usually leads failing the exams. Remember that the goal of the homework is to master the material and techniques we're teaching, not simply to get through that week's assignment.

So, what *should* you do? There are a few effective approaches you can try for working with a partner:

- *Solve the problem separately, then compare and synthesize.* In this approach, the two people working as partners each do their best to complete the problem individually. Once they're (mostly) done, they come together and read over each other's answer, giving feedback about what they liked ("oh, I didn't think of that – that's so clever!") and what they think needs work ("I see what you're going for here, but I think X works in way Y rather than way Z"). Finally, the two partners write a single final answer jointly, synthesizing ideas from each solution. This gives both of you significant practice critiquing work (a valuable skill!) and lets each person benefit from the other's insights.

- *Work each problem together, trading off who leads.* In this approach, both partners work together on each problem simultaneously, bouncing ideas off one another and offering real-time feedback and critiques of ideas. To make sure that both partners get experience with problem-solving, on each problem one person will take a lead role, choosing which paths to explore, drawing pictures, etc. The other person will take a supporting role, offering feedback about ideas the lead person generates ("yeah, that sounds good!," "I remember concept X working differently – doesn't it mean Y and Z?", "I think you meant A' when you said A there", etc.) The partners trade off the lead role to ensure that both of them learn both to synthesize new ideas and to evaluate potential routes.

- *Do some preliminary exploration, then come together to solve things.* This is a hybrid of the two above approaches. Each partner spends some time individually looking over the problem set question and trying out some ideas. This could include things like setting up proofs (what will you assume and what do you need to show?), drawing pictures ("here's my visualization of what this problem is asking us"), and reviewing relevant lecture topics ("I think this is asking something along the same lines as this lecture example"). From there, the partners can either decide to try to solve the problem individually using what they've found or work on the problem jointly.

How do I submit work with a partner?

If you're working with a partner, you must make a single joint submission. Gradescope makes this easy – one partner uploads the joint submission, then adds the other person as a partner. This guide shows how to do that.

Assignments and corrections

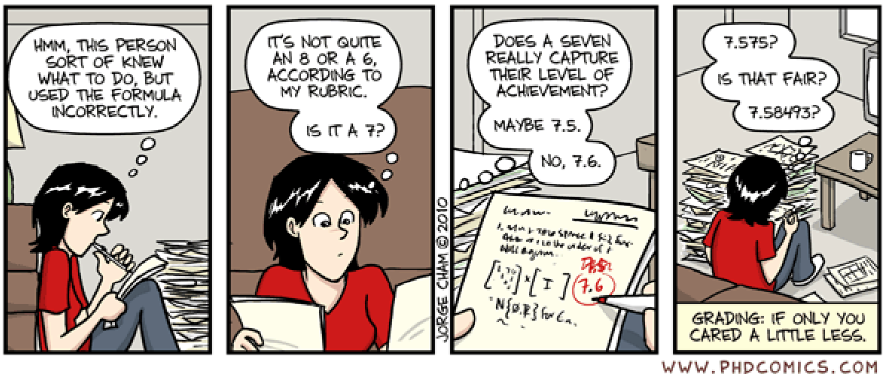
In many courses, homework turns into a painful cycle: If you make mistakes on an assignment, turn it in, get your grade back a week and a half later, throw it in a notebook because the class has moved on to other material, and don't think about those problems again until exam time, you won't learn from your mistakes, and the time and effort you spent on the homework will have been wasted.

In this class, we're making an effort to do better. Instead of submitting assignments (often late) and then waiting for me to grade and comment on your work after all assignments are in, I will be releasing example solutions as soon as the assignment is due and then asking you to correct your own work. This ensures that you will review the exercises while you still remember what you were thinking, and you will get credit for learning from what you did wrong, rather than be punished for not knowing the material perfectly from the start.

It's entirely reasonable to make mistakes when you're first learning material. As such, I want the homework assignments to be low stress. This is my promise: If you make a serious effort to solve the problems, turn them in by the deadline, and carefully review your work to understand how your solutions could be improved, then your homework grade will be very high, even if you initially make mistakes on every problem.

How to correct your assignments

The first thing to do is to figure out how you did at answering an exercise. The goal is *not* to agonize over assigning yourself points, so we'll just evaluate answers using the categories ○, ✗, ✓−, ✓, and ✓+. Rather than focus on your "score" for an exercise, you should focus on understanding the example solution and what you could improve in your answer, even if your answer was “right”.



Assigning fine-grained points is an exercise in frustration.

- 0: *No serious attempt.*

  If you didn’t give a serious answer to a problem, it should be marked as 0. This indicates a failure to complete the assignment.

- ✗: *Incomplete or mostly incorrect.*

  These answers require significant correction. If your solution is close enough that it can be edited to be correct, e.g., by filling in the part after you got stuck, do so, but most answers in this category are so far off – for instance, giving a proof in the wrong direction – that you should instead rewrite the example solution in your own words and write a comment on what you misunderstood.

  Why did you prove the wrong direction, misunderstand the question, construct a malformed Turing machine, etc.? If you can identify for yourself what you were doing wrong, then you’ll know what to do right the next time!

- ✓–: *Borderline.*

  If your answer is more or less incorrect but on the right track or if it’s correct but muddled in the argument, then you’ve written a solution that should be edited to be correct. Don’t just paraphrase the example solution! Instead, take the time to understand what the significant differences are between your answer and the example solution and fix your answer to correct its shortcomings.

  Write a description of what you changed and why the original answer was incorrect or unclear.

- ✓: *Mostly correct.*

  An answer that demonstrates understanding of the problem and is generally clear and correct. Nonetheless, there are some minor flaws in the logic or presentation.

  Note what needs to be changed and make the appropriate corrections, e.g.,

  > "I didn't realize the description of the language included ε. To accept the empty string, just change the start state to an accept state and everything else stays the same."

  or,

  > "I missed a step in the proof. If A is an infinite language, then..."

- ✓+: *Turing's ghost weeps with pride.*

  The solution is clear and correct. There are at most one or two *trivial* flaws that can be easily corrected.

  For a problem with a non-trivial answer, e.g., a state diagram of a DFA or a proof, you should briefly comment on the differences between the example solution and your own. E.g.,

  > "My solution is functionally equivalent but doesn't reuse state q_2 when inputs begin with a since I found it clearer to have separate branches of computation."

Examples

Below are two example exercises with a student's initial answer and good corrections.

Exercise 1

Prove or disprove: If $A \subseteq B$ and $A \subseteq C$, then $A \subseteq B \cap C$.

Answer:

PROOF Since $A \subseteq B$, it means that some group of the elements of B is the set A. Since $A \subseteq C$, it means that some group of the elements of C is the set A. Therefore, some group of the elements of $B \cap C$ is the set A, so $A \subseteq B \cap C$. ∎

Evaluation: ✓−

Corrections and comments:

The basic idea of this proof is right, but the writing is not clear and convincing. It doesn't introduce the variables (A, B, and C) properly, and the argument is too high-level; it should be about individual elements.

PROOF Let A and B be sets, where $A \subseteq B$ and $A \subseteq C$. We will show that $A \subseteq B \cap C$. Consider any $x \in A$. Since $x \in A$ and $A \subseteq B$, we know that $x \in B$. Since $x \in A$ and $A \subseteq C$, we know that $x \in C$. This means that every $x \in A$ satisfies $x \in B \cap C$, so $A \subseteq B \cap C$, which is what we needed to show. ∎

Exercise 2

Prove or disprove: If $A \subset B$ and $A \subset C$, then $A \subset B \cap C$.

Answer:

PROOF Since $A \subset B$, it means that some group of the elements of B is the set A, and there are some other elements of B. Since $A \subset C$, it means that some group of the elements of C is the set A, and there are some other elements of C. Therefore, some group of the elements of $B \cap C$ is the set A, and there are some other elements of $B \cap C$, so $A \subset B \cap C$. ■

Evaluation: ✗

Corrections and comments:

This proof has similar stylistic problems to the previous exercise, but most importantly the informal writing hides the fact that it's wrong! My answer misses an important requirement, which is that the claim is about *proper subsets* ($\subset$ not $\subseteq$).

To disprove the claim, consider this counterexample:

$$A = \{1\}$$
$$B = \{1, 2\}$$
$$C = \{1, 3\}$$

You can see that this satisfies the antecdent: $A \subset B$ and $A \subset C$. However, $B \cap C = \{1\}$. While it's true that $A \subseteq B \cap C$, there's no element in $B \cap C$ that isn't in A, so it can't be a proper subset.

How I'll grade your assignments

You're marking and correcting your own assignments in order to clarify your understanding of the course material. I'll still assign the final grades, as follows:

I will go over your answers and corrections, assigning a point value to each answer in the range 0–4, typically corresponding to your own evaluation of your work using the categories 0, ✗, ✓−, ✓, and ✓+, but raising or lowering at my discretion. I will average these points to get an initial score for the assignment as a whole.

If your assessments and corrections of your answers are careful, I will add up to 1 point (i.e., a quarter of the total possible points) to the assignment score. So, if you have mistakes on *every* problem, you can still have a perfect final score, but only if you go over your work carefully!

Conversely, if you don't complete corrections or your corrections show that you haven't carefully considered the solutions, then you may *lose* up to 1/2 point, so an assignment where every problem was answered perfectly could become a 3 1/2 out of 4.

Assignment expectations

1 *Assignments will only be accepted until the due date.*

This is for everyone's benefit. Unfortunately, it's impractical to allow late assignments without punishing the rest of the class by delaying releasing solutions.[1]

If you know you won't be able to submit an assignment, talk to me, as early as possible.

2 *Late corrections will be accepted with a penalty.*

If you're unable to do your *corrections* by the day they're due, they can be turned in up to the start of the next class, for 75% of the original value. After that, corrections won't be accepted.

[1] And, in practice, late submissions are usually half-hearted bids for partial credit rather than sincere efforts to learn.

3 *You must make a serious attempt to answer every exercise for an assignment to count.*

This doesn't mean you need to get them all right, but it's unacceptable not to attempt a problem and just wait for the solutions, e.g., because it looks hard or you didn't leave yourself enough time.[2]

To count toward a complete submission, any problem for which you can't give a full solution needs to be accompanied by a clear explanation of your thinking and what you tried, e.g.,

> "Here's an NFA I could design for the language, but I couldn't make an equivalent regular expression because everything I tried would also match strings that aren't in the language, for instance, ..."

or,

> "I could prove that A is a subset of B, but proving that B is also a subset of A seems to require that B exhibit the following properties that I don't know how to prove..."

4 *Assignments must be neat and clear.*

Your assignment must be easy to read and must clearly indicate both your original solutions and your corrections.

In this course, we care about your ability to communicate mathematical arguments precisely. Small errors in wording or in notation can make an otherwise correct proof completely incorrect. As such, we ask that you submit PDFs of clear, *typed* work rather than handwritten answers.

You can type your answers using any software you like, but I recommend using LaTeX, which is a standard tool for publishing research in computer science and mathematics. You may find it easiest to use Overleaf[3] to edit LaTeX in a web browser. LaTeX templates will be available for each assignment on the course website.

5 *Do not include your name in the assignment itself.*

To avoid any (unintentional) bias, I grade your work *anonymously*. Your name is automatically recorded when you upload your work.

[2] You should try to start assignments early enough that we can discuss exercises you don't understand or get stuck on. I know that sometimes deadlines pile up – they do for me too – but this should be possible!

[3] overleaf.com

Acknowledgments

Parts of this handout are adapted from a guide by Keith Schwarz, Stanford University.