DIRECTIONS AND GUIDELINES FOR THE EXAM 2 REWRITE

You are allowed to rewrite up to TWO of your Exam 2 problems for full credit. That is, your score on each rewritten problem will replace your original score on that problem. (If your rewrite score on a given problem is less than your original score, you will not be penalized; your score on that problem will not change.)

Rewrites are due no later than **the start of class on Friday, April 26.** No late rewrites will be accepted. You may submit your rewrite either online via Canvas, or by hard copy.

In completing your rewrites, you MUST adhere to the following. There's a fair amount to read here; **please read it**.

1. For your rewrite, you are allowed to use any aids or sources (calculator, books, notes, web, AI, etc.), but your write-up MUST be in your own words, and must reflect that you understand the problem clearly.

2. Please show all work and *explain all answers thoroughly.* In particular, **mere calculations aren't enough.** For example, if you are doing an induction proof, clearly indicate your base step, your induction hypothesis, your induction step, your conclusion, and so on. There are lots of induction problems solved in the solutions to HW assignments to guide you.

   Similarly, when doing a limit proof, be clear about what's scratchwork and what's not. And you DON'T have to show your scratchwork, but if you do, you need to REPEAT the necessary calculations from the scratchwork OUTSIDE of the scratchwork. (The scratchwork is NOT part of the proof, but showing the calculations that get you from $n > R$ to $|x_n - L| < \varepsilon$ must be.) Also, as with induction (or any other) proofs, make sure to state your conclusion at the end.

3. Please be as neat as possible. If I can't read it, I can't grade it. Illegible answers will get no credit.

4. **SPECIAL NOTES FOR EXAM PROBLEM #1.** Don't confuse indices of a set with elements of a set. For example, $\bigcap_{\alpha\in\{1,2,3\}} A_\alpha$ means $A_1 \cap A_2 \cap A_3$. None of this says anything about what A_1, A_2, and A_3 contain.

   Here's one way to think about this exercise: what happens if I intersect a whole bunch of sets, compared with what happens if I intersect just a few of these sets?

5. **SPECIAL RULES FOR EXAM PROBLEM #4.** If you are going to rewrite this problem, you **MUST** use the strategy outlined here (whether or not you used this strategy originally). The goal here is to construct a proof that assumes as little as possible, and proceeds from first principles as much as possible.

   So here are the rules:

   - As the problem says, your proof must proceed "by showing that the set defined on the left hand side of the equal sign is contained in the set on the right, and vice versa." Please do not use another strategy.

- Please use **ONLY** the definitions of union, intersection, difference, and symmetric difference of two sets. That is, please **DO NOT** use other set "facts" (even if they have been proved elsewhere), like: "distributivity " laws (even ones we've proved in class); any set facts from S-POP (like: Proposition B(ii)-1_E, Exercise B(ii)-3, Exercise B(ii)-4, or Proposition B(ii)-2_E), or any other facts about sets that you might find anywhere else.

  In the original problem, it said you could use facts like the above if you cited them. For this rewrite, you can't. This problem *can* be done using only the definitions.

  Of course, you CAN use the given definition

  $$C\Delta D = (C - D) \cup (D - C).$$

- Keep your proof to one page at most. You should not need more than this. If you do, think about how to make your proof more concise.
- As with any proof, state your assumptions and conclusions clearly.
- Warning: it does not follow from $x \notin C \cap D$ that $x \notin C$. For example, $3 \notin \{0,1,2,3\} \cap \{0,1,4,5,6\}$, but $3 \in \{0,1,2,3\}$.
- Another warning: it does not follow from $x \in C$ that $x \in C-D$. For example, $3 \in \{0,1,2,3\}$ but $3 \notin \{0,1,2,3\} - \{3,4,5,6\}$.
- DO NOT write things like "by union." That's not a thing. If you mean "by definition of union," then write it out. Similarly for "by intersection," etc.
- DO NOT write things like "sym diff." That's not a thing. If you mean "symmetric difference," then please write that.
- "Subtraction" is not a set thing. If you mean "set difference," then please write that.

6. **SPECIAL RULES FOR EXAM PROBLEM #7.**

- Please don't skip steps. For example, if we assume that $15|n$, it's not enough to say something like "since $15 = 3 \cdot 5$, this implies that $3|n$ and $5|n$." You need to show, explicity, from the assumption that n is an integer times 15, that n is an integer times 5 and that n is an integer times 3.
- Please don't use arguments like "because 3 and 5 are relatively prime" or "because 3 and 5 are coprime." Please don't use any general facts about how integers behave when they're relatively prime. We may have mentioned things like this in class, but we never proved anything along these lines. Please use the indicated hint: $5 = 3 \cdot 2 - 1$.
- Here's one more hint, if you need it: if $n = 5m$ then, since $5 = 3 \cdot 2 - 1$, we have

  $$n = (3 \cdot 2 - 1)m = 3 \cdot 2 \cdot m - m = 3 \cdot (2m) - m$$

  or, solving for m,

  $$m = 3 \cdot 2m - n.$$

  Show that, under the given assumptions, the right hand side is divisible by 3. (You MAY use S-POP Exercise B(i)-3 here, but if you do, cite that exercise.)