
Math 2710 Exam 2 Review

For the exam, I will pick about one question from each of the 6 topics below. The questions won't all be directly from the book but doing book problems is good practice. Solutions to the ODDS are in the back, but remember reading solutions is NOT a good study technique.

I have also included a few extra practice problems to get you started.

Conditional Statements

1. (Prove or disprove) If both ab and $a + b$ are even, then both a and b are even.
2. (Prove or disprove) If $a, b \in \mathbb{N}$, $a + b < ab$.
3. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=148> problems 14-32 and <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=156> 1-18.

Non-Conditional Statements (For all, there exists and bi-conditional)

4. For every positive $x \in \mathbb{Q}$, there exists a positive $y \in \mathbb{Q}$ for which $y < x$.
5. Every odd integer can be written as the sum of three odd integers.
6. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=167>, 1-24.

Set Equality

7. (Prove or Disprove) If A, B and C are sets, then $(A \cup B) - C = (A - C) \cup (B - C)$.
8. (Prove or Disprove) Suppose A, B and C are sets. If $A = B - C$ then $B = A \cup C$.
9. Suppose A, B and C are sets. Show that if $A \subseteq B$, then $A \times C \subseteq B \times C$.
10. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=183>, 1-30.

Disprove

11. See above.
12. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=191>. 1-35

Induction

13. If $n \in \mathbb{N}$, then $1 \cdot 3 + 2 \cdot 4 + 3 \cdot 5 + 4 \cdot 6 + \cdots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$.
14. Prove that $\sum_{i=1}^n (8i - 5) = 4n^2 - n$ for every positive integer n .
15. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=207> 1-42.

Counting

16. A group of twenty people needs to pick a team lead, a reporter and an advisory board of three people. How many ways can this be done?
17. Jonathan's Diner is having a dinner special. You can either choose a soup or salad. There are two soups, and 3 salads each with two choices of salad dressing. Then you get to choose with an appetizer and dinner or a dinner and dessert. If there are 4 appetizers, 3 dinners and 16 dessert options, how many total meal possibilities options are there?
18. See <https://www.people.vcu.edu/~rhammack/BookOfProof/Main.pdf#page=96> 1-17.

Extra Point Opportunity

Pick a topic and an even numbered question (can't be a HW question) or one of the problems above. Post a solution to Campuswire. If it's right, you get extra points! You can also post practice material like the last exam.