
Please staple or paper-clip your homework sheets (no folding over corners), and consider writing more than one draft. You are expected to spell correctly and write complete, grammatical sentences when possible in this and all your university assignments, except when you are instructed that you may simply write down the answer. Homework solutions will be distributed when the assignment is due. No late homework is accepted, but the lowest two homework scores (possibly zero) will be omitted in computing your homework average. In rare instances, you may be excused from an assignment, but the dropped scores are intended to cover ordinary illnesses, etc.

There are two kinds of homework problems: ungraded and graded. Ungraded problems have answers in the back of the book. Subject to unimportant numerical changes, one or two of them will show up on each test. Graded problems don't have answers in the back of the book. This assignment is different from the later assignments in that it is less obvious how you are expected to do the problems.

1. – (ungraded) §1.8 – 4. (Look at how the n -th column can be covered.)
2. – (ungraded) §2.4 – 4.
3. – (ungraded) §2.4 – 9.
4. – §1.8 – 2. (A sufficiently clear picture will be ok; for clarity, write $m = 2j + 1$ and $n = 2k + 1$.)
5. – §1.8 – 26.
6. – §2.4 – 5.
7. – §2.4 – 11.
8. (Explicit Chinese Remainder Theorem) Write out a 4×5 table, with rows labeled “0” through “3” and columns labeled “0” through “4” and filled with the integers 0 through 19 and so that m is in row “ $m \bmod 4$ ” row and column “ $m \bmod 5$ ”. For example, 12 is in row “0” and column “2”.
9. Let S be a square of side length $6\sqrt{2}$ cm.
 - a. Show how to place 9 points in S so that the distance between any pair is $\geq 3\sqrt{2}$ cm. (A picture is enough.)
 - b. Show that if 10 points are placed in S in any way, then there is a pair at distance ≤ 4 cm. (A picture and a few sentences.) (A tempting, but **false** proof, begins with assuming that 9 of the 10 points are arranged as in a. You cannot assume that!)
10. Consider the following 5×5 array

1	2	3	4	5
2	3	4	5	1
3	x			
4				
5				

Find **all** 5×5 Latin squares on the symbols $\{1, 2, 3, 4, 5\}$ which have first two rows and first column given above. I have put x in as a start. You should consider the cases $x = 1$, $x = 4$ and $x = 5$ separately. You may have to “branch” your reasoning a few times. It is **not** necessary to show your work or to explain your answer, but you won't learn much if you just copy from a friend!