MATH 354: PROBLEM SET 4

RICE UNIVERSITY, FALL 2019

Due date: Friday, September 27th, by 5pm in my office (you can slide it under the door). You are welcome to turn in your work during lecture on Friday.

Parts A, and B should be handed in **separately**. They will be graded by different TAs.

Please staple your homework!

Reminder from the syllabus: "The homework is not pledged and you can collaborate with other students in the class. In fact, you are very much *encouraged* to do so. However, you are not allowed to look up solutions in any written form; in particular, you are not allowed to look up solutions online. **Students caught violating this rule will be reported to the Honor Council.** You should write up your solutions individually."

1. Part A

Hand in the following exercises from Chapter 2 of Axler's book:

2C: 11, 12, 17.

2. Part B

Hand in the following exercises from Chapter 3 of Axler's book:

3A: 1, 3, 11, 13.

3. Comments

(1) Problems 2C.11 and 2C.12 look daunting, but they are easier nuts to crack than you might imagine. The "dimension of a sum" formula 2.43 in Axler should help. If anything, seeing how the formula can help solve very difficult looking problems is great motivation for trying to understand its proof!

(2) The result of Problem 3A.3 is important. The problem says that a linear map $T\colon \mathbb{F}^n \to \mathbb{F}^m$ can be encoded by $m \times n$ numbers, organized as m bunches of n

Date: September 20th, 2019.

numbers. Usually, we write this as a matrix:

$$\begin{bmatrix} A_{1,1} & \cdots & A_{1,n} \\ \vdots & \cdots & \vdots \\ A_{m,1} & \cdots & A_{m,n} \end{bmatrix}$$

More on this in Section 3C.

(3) For Problem 3A.11, recall that a basis of a subspace can always be extended to a basis of the full space, and a linear map is determined by what it does on a basis.

(4) For Problem 3A.13, the Linear Dependence Lemma should come in handy.