

# Assignment #6; MA353; Term: S19

Leo Livshits

Last modified at 10:09 on April 12, 2019

## Problem 1

1. Problem 20 in Exercises 6.A in Axler
2. Problem 21 in Exercises 6.A in Axler

## Problem 2

1. Problem 24 in Exercises 6.A in Axler
2. Problem 25 in Exercises 6.A in Axler

## Problem 3

1. Problem 27 in Exercises 6.A in Axler
2. Problem 28 in Exercises 6.A in Axler

## Problem 4

1. Use Cauchy-Schwarz inequality to show that

$$\alpha_1 + \alpha_2 + \alpha_3 + \dots + \alpha_n \leq \sqrt{n} \cdot \sqrt{\alpha_1^2 + \alpha_2^2 + \alpha_3^2 + \dots + \alpha_n^2}$$

for any non-negative  $\alpha_i$ .

2. Problem 14 in Exercises 6.B in Axler

**Problem 5**

1. Suppose that  $z_1, z_2, \dots, z_n$  is an orthonormal list of elements of a (not necessarily finite-dimensional) vector space  $V$ , and  $w$  is an element of  $V$  that is not in the span of  $z_1, z_2, \dots, z_n$ .

Use **Gramians** to argue that there is an element  $y \in V$  such that  $z_1, z_2, \dots, z_n, y$  is an orthonormal list and

$$\text{Span}(z_1, z_2, \dots, z_n, y) = \text{Span}(z_1, z_2, \dots, z_n, w) .$$

2. Problem 2 in Exercises 6.B in Axler