Linear Algebra – Homework 5 (corresponding to Quiz 5)
May 18, 2022

1. (30%) Given the table of data points:

x	1	2	3
y	2	4	4

Find the best least squares fit by a linear function $f(x) = c_1 + c_2 x$.

2. (40%) Let $\{u_1, u_2, u_3\}$ be an orthonormal basis for a three-dimensional subspace S of an inner product space V, and let

$$x = 6u_1 - 3u_2 + 2u_3, \quad y = 5u_1 + 8u_2 - 3u_3$$

(a) Determine the value of $\langle x, y \rangle$.

(b) Determine the value of $\|x\|$.

3. (30%) Show that for any u and v in a normed vector space,

$$\|u + v\| \geq |\|u\| - \|v\||$$

(注意不等式右邊有絕對值; Note the absolute value on the right-hand side)