M346 (55820), Homework #10

Due: 12:00pm, Friday, Apr. 06

Instructions: Questions are from the book "Applied Linear Algebra, 2nd ed." by Sadun. Please show all your work, not only your final answer, to receive credit. Keep answers organized in the same order the problems have been assigned.

Gram-Schmidt orthogonalization (6.5)

p. 166-167, #5, 8, 11

Projections (6.6)

p. 169, #1

Least squares (6.7)

p. 174-175, #1, 3, 4

In addition:

A) Let $V = \mathbb{C}^n$ with the standard inner product, and P_W be projection onto a subspace W. Show that

    i. The matrix P_W satisfies $P_W^* = P_W$ (i.e., P_W is Hermitian).

    ii. $P_W^2 = P_W$.

    iii. $P_W P_{W^\perp} = 0$.

B) Find the best fit of the circle $x^2 + y^2 + cx + dy + e = 0$ to the set of points $\{x_i, y_i\}_{i=1}^5 = \{(1, 1), (2, 0), (3, 1), (3, 2), (2, 2)\}$. Then plot this circle and the data points in the plane for a visual comparison.