Math 320, Fall 2018 **Jerry L. Kazdan**

Problem Set 8

DUE: Thurs. Nov. 8 in class. [Late papers accepted (without penalty) until 1:00 PM Friday.]

Please read the notes `https://www.math.upenn.edu/~kazdan/320F18/Notes/vectors12.pdf` on Vectors and Least Squares
and also Chapters 8.1, 7.1-7.2 in Burden-Faires

Problems

1. Notes on Vectors p. 16–19, #2

2. Notes on Vectors p. 16–19, #3

3. Notes on Vectors p. 16–19, #4

4. Notes on Vectors p. 16–19, #5b,c

5. Notes on Vectors p. 16–19, #6

6. Notes on Vectors p. 16–19, #7

7. Notes on Vectors p. 16–19, #8

8. Notes on Vectors p. 16–19, #9

9. Let $Z_j = (x_j, y_j)$, $j = 1, \ldots, , N$ be (data) points in the plane $\mathbb{R}^2$, say the height and weight of the j^{th} person in a medical test. Problem: find the straight line $\mathcal{L} := \{(x, y) \in \mathbb{R}^2 \,|\, ax + by = c\}$ that best fits this data in the sense that it minimizes the function

$$Q(\mathcal{L}) := \sum_{j=1}^{N} [\text{Distance}(Z_j, \mathcal{L})]^2.$$

   a) Thus, we need to determine the parameters a, b, and c. As should be clear in your computation, it is simplest to investigate first the special case where $\sum_{j=1}^{N} Z_j = 0$.

   b) Apply this procedure to the data points $(0, 0)$, $(1, 3)$, and $(2, 7)$.

10. Burden-Faires, Sec. 8.1 #8

11. Burden-Faires, Sec. 8.1 #13

[Last revised: November 3, 2018]