

Problem Set 1

Prof. Oke

CEE 260/MIE 273: Probability & Statistics in Civil Engineering

09.04.2025

Due Tuesday, September 15, 2026 at 12:59 PM as PDF uploaded via Gradescope. Submit your file as a PDF. There are 3 problems, with a total of 17 points.

Problem 1 (5 points)

Respond “T” (*True*) or “F” (*False*) to the following statements. Use the boxes provided. Each response is worth 1 point.

(i)

☐

The standard deviation of a random sample is a measure of its central tendency.

(ii)

☐

In a perfectly symmetric distribution, the median is equal to the mean.

(iii)

☐

A right-skewed distribution has a long left tail.

(iv)

☐

In a boxplot (introduced in 1970 by John Tukey), the whiskers are conventionally selected as the values closest to within $Q_1 - 1.5IQR$ and $Q_3 + 1.5IQR$. In this case, the distance between the whiskers is $4IQR$.

(v)

☐

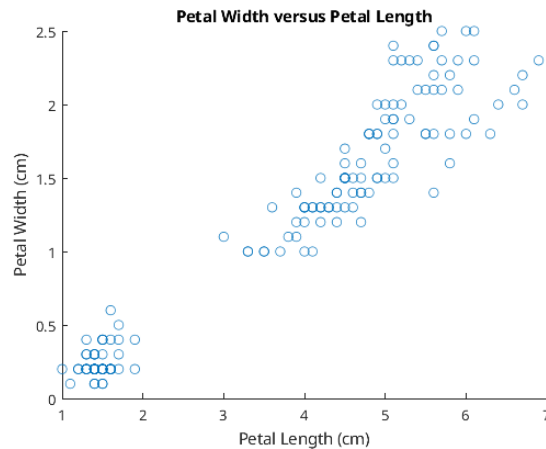
The mean of a sample dataset can be determined from its boxplot.

Problem 2 (2 points)

How would you describe the relationship between the variables shown in each of the following plots? Indicate the correct answer in each case (by circling, or otherwise).

[1]

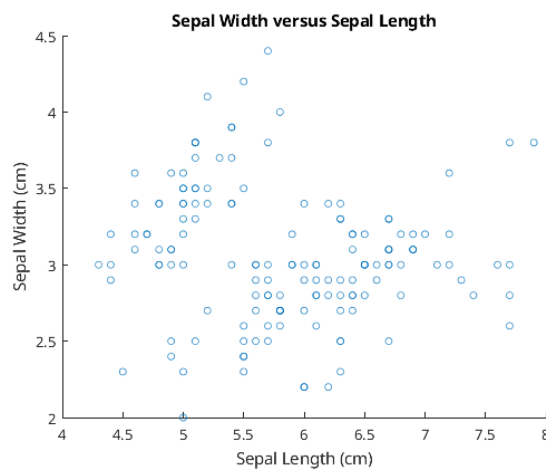
(a)



- (i) Approximately linear
- (ii) Nonlinear
- (iii) No discernible relationship

[1]

(b)



- (i) Approximately linear
- (ii) Nonlinear
- (iii) No discernible relationship

Problem 3 (10 points)

You are given a sample of 43 beak sizes (X) measured from a certain bird species on an island. The sample mean $\bar{X}$ is 10.77 mm and the sample variance $s^2 = 1.048$. The median m is 10.65 mm.

- (a) Find the sample standard deviation s of the dataset. [2]
- (b) Find the sampling error (also known as the standard error of the mean, SE). [2]
- (c) Find the coefficient of variation δ_X . [2]
- (d) The first and third quartiles of the sample are given by $Q_1 = 10.2175, Q_3 = 11.22$.
- (i) What is the second quartile? [1]
- (ii) Find the interquartile range (IQR) of the sample. [1]
- (e) The maximum value of the sample is 13.49 mm. If a boxplot is constructed with the whiskers determined by $Q_1 - 1.5IQR$ and $Q_3 + 1.5IQR$, would you expect to see any outliers in the plot? Explain briefly. [2]