

Laboratory Quality Systems Homework # 5 – Method Validation

Due by Midnight on Monday, March 30, 2026

Question # 1 (5 pts)

Your lab has an analyte with an unknown concentration and you want to estimate the concentration using a calibration curve. The instrument response was 521 nm for the unknown concentration. Use the data from the attached excel sheet (in Canvas) – hw5.xlsx in the worksheet labelled “Problem #1” to complete the following:

- Plot the curve (concentration vs. Result – See [Calibration Curve presentation](#)).
- Find the linear equation and the correlation coefficient.
- Use the calibration curve equation to estimate the unknown concentration.

Question # 2 (5 pts)

Ten different labs are doing PT testing and running samples in duplicate. Their results are recorded in the attached spreadsheet. Before analyzing results, the program director wants to determine if the dataset has any outliers. Use the data from the attached excel sheet (in Canvas) – hw5.xlsx in the worksheet labelled “Problem # 2” and Problem # 2 -1a – b” to complete the following ([See Cochran and Grubbs Outlier presentation](#)):

- Determine if there are any outliers in the dataset using the Cochran and Grubbs tests. What are the outliers? Clearly identify the outliers.
- Why is important to run both a Grubbs single outlier test and a Grubbs paired outlier test?
- Besides removing the outliers, are there any other actions that you would take and why?

Question # 3 (5 pts)

12 blank samples are run on a new HPLC instrument. The limit of detection and limit of quantitation need to be calculated. Use the data from the attached excel sheet (in Canvas) – hw5.xlsx in the worksheet labelled “Problem #3” to complete the following:

- What is the LOD?
- What is the LOQ?

Question # 4 (5 pts)

Twelve labs are testing a sample in duplicate for a proficiency testing program. Before analyzing the results and determining a consensus mean and sd, outlier tests need to be run ([See Cochran and Grubbs Outlier presentation](#)). Use the data from the attached excel sheet (in Canvas) – hw5.xlsx in the worksheet labelled “Problem # 4” and Problem # 4 -1a – b” to complete the following:

- How many outliers are in the dataset? What are the outliers? Clearly identify the outliers.

- b) Calculate the consensus mean and standard deviation with all the labs and then calculate it again with the outliers taken out. What impact do outliers have on PT program results?

Resources

Data for Homework # 5 – On Course Website (hw5.xlsx)