Forensic Science Homework 1.

Directions: Neatly handwrite answers on a different piece of paper. Preface each answer with the question number. Do not rewrite questions. Do not overanswer. 1 – 4 sentences (or fragments) is sufficient for most questions.

1a. List two things that the scientific process and judicial process have in common.
1b. List two ways that the scientific process and judicial process differ.

2. Justify whether a false positive or a false negative is a preferred outcome for the American judicial process. Include the definitions of false positive and false negative in your answer.

3. Choose one of the following practices that can improve scientific data. Explain how (or why) it accomplishes that purpose.

Practices: sequential testing, blind controls, negative control

4. Choose one "QA/QC" practice that you would use if you were the hiring manager of a forensic lab. Explain why that practice is important.

Use the calibration curve in Figure 1 to answer questions 5 – 8.

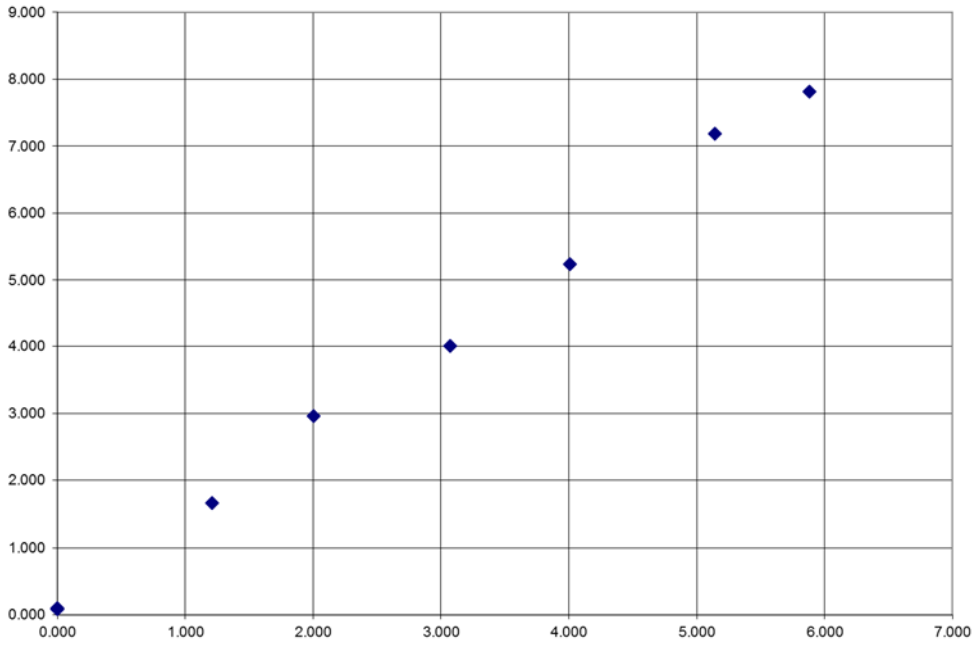


Figure 1. Calibration curve. Line equation is: $y = (1.327 \pm 0.036\ ppm^{-1})X + 0.093 \pm 0.131$

5a. Assuming this is an absorbance spectroscopy method, how should you label each axis? (x- axis =; y –axis =)
5b. Assuming this is a chromatography method, how should you label each axis? (x- axis =; y –axis =)

6. Based on the graph in Figure 1, what is the linear range of this method?

7. If another method, with higher sensitivity was used, how do you expect the graph to change?

8. If a sample had a signal of 5.172, what would be the concentration of analyte in the sample, with error?

Questions 9 – 12 refer to the following spectrum

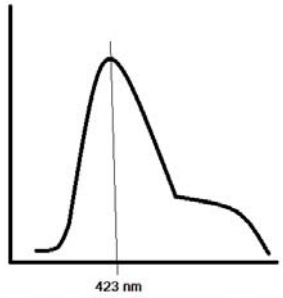


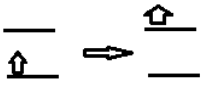
Figure 2. Absorbance spectrum

9. Label each axis

X-axis =

Y-axis =

10. What region of the spectra is this measurement being taken in?

11. If the major peak represents the transition: 

Describe how it would look different for the little peak

12. Describe how the spectrum would change if a lower concentration of the same substance were measured.

Questions 13 – 16 refer to the following chromatogram


Figure 3. Chromatogram

13. Label the axes.

14. How many substances are part of the sample?

15. How would the chromatogram change if a new substance were added to the sample that had a strong affinity for the stationary phase?

16. How would the chromatogram change is more of the substance that had the least affinity for the stationary phase was added to the sample?

17. What are the axes on a mass spectrum?

18. Where would you find the molecular ion peak on a mass spectrum?