Exercise 4: Calibration Methods:

(1) A sample containing Ca^{2+} is tested as described in the table below. A 2.00×10^{-3} M Ca^{2+} standard is added in tube #2 and tube #3. The instrumental signal is directly proportional (i.e. linear) to the concentration of the analyte.

Tube #	mLs of Ca^{2+} unknown	mLs of Ca^{2+} standard	Signal
1	5.0	0.0	1.50
2	3.0	2.0	1.30
3	2.0	4.0	? (solve for this too)

1) What is the name of this calibration method? Name 1 advantage and 1 disadvantage.

2) What is the concentration of the unknown Ca^{2+}?

3) What is the predicted signal in tube #3?

(2) A sample containing Cr^{2+} is tested using two standards: a 20.0 ppm Cr^{2+} standard and a 10.0 ppm Pb^{2+} standard. Aliquots of the Pb^{2+} standard are added to the unknown Cr^{2+} and the standard Cr^{2+} samples as described in the data table below.

Test tube#	mL Cr^{2+} unk	mL Cr^{2+} std	mL Pb^{2+} std	I_{Cr}	I_{Pb}
1	2.00	0.00	3.00	36.0	60.0
2	0.00	3.00	4.00	64.2	57.1
3	3.20	1.00	3.50	?	?

1) What is the name of this calibration method? Name 1 advantage and 1 disadvantage.

2) What is the concentration of the unknown Cr^{2+}?

3) What are the predicted signals in tube #3?