Assignment 3

Problem 1

The concentrations of ascorbic acid in a vitamin and minerals complex are given in mg per tablet in four samples obtained from the same lot. Test the claim that the means of the four samples are equal using analysis of variance. Verify all assumptions made by this analysis. Clearly indicate each hypothesis you are testing.

Sample 1	Sample 2	Sample 3	Sample 4
489.12	507.39	508.18	489.12
489.48	496.29	501.77	489.48
487.76	496.09	496.91	487.76
490.09	506.04	500.53	490.09
492.32	506.52	495.37	492.32
493.53	496.28	489.97	493.53
486	506.31	496.71	486
483.2	497.05	494.21	483.2
476.31	499.87	497.18	476.31
495	495.82	502.12	495
495.76	503.64	496.34	495.76
488.78	510.31	504.21	488.78
498.69	504.38	492.35	498.69
480.5	507.83	493.81	480.5
486.33	497.56	500.65	486.33
485.87	496.65	496.867	485.87
491.62	494.66	503	491.62
489.9	502.31	498.08	489.9
495.85	492.74	500.15	495.85
484.37	505.98	501.01	484.37

Problem 2

The following results were obtained when each of a series of standard silver solutions was analysed by flame atomic-absorption spectrometry.

Task 1: Produce the calibration plot and comment on the observed relationship.

Task 2: Calculate the coefficient of correlation and interpret its value.

Task 3: Test the correlation coefficient for significance clearly indicating how the test statistic is obtained.

Task 4: Determine the slope and the intercept of the calibration plot and their corresponding 95% confidence intervals.

Task 5: Determine the expected absorbance value if the concentration is 10.5 .

Task 6: Determine the silver concentration in a sample giving absorbance of 0.3 and calculate the 95% confidence interval for this estimate.

Task 7: Determine the silver concentration in a sample giving absorbance of 0.5 and calculate the 95% confidence interval for this estimate.

Task 8: Determine the silver concentration in a sample giving absorbance values of 0.51,0.49,0.50 and 0.50 in four separate readings and calculate the 95% confidence interval for this estimate.

Task 9: Compare the three confidence intervals.

Task 10: Estimate the limit of detection of the silver analysis.

Concentration	1	2	3	4	5	6	7	8	9	10
Absorbance	0.013	0.05	0.083	0.105	0.107	0.16	0.197	0.213	0.236	0.23

Concentration	11	12	13	14	15	16	17	18	19	20
Absorbance	0.277	0.303	0.321	0.367	0.363	0.39	0.405	0.446	0.475	0.51