**Linear regression**

1) What are the assumptions of linear regression?

2) How can we randomize the measurements during an analitical calibration? Why is it recommended?

3) What plot can be used to test if the variance of the measurement error is constant at linear regression? What are on the axis? How should the plot look like if the assumption is fulfilled and how should it look like if the assumption doesn’t fulfilled? Draw examples!

4) After fitting a linear regression line half of the points are out of the confidence band. Is this surprising? What could be the reason?

5) After fitting a linear regression line half of the points are out of the prediction band. Is this surprising? What could be the reason?

6) Is the prediction interval is always wider than the confidence interval? Why?

7) What do we call residuals at linear regression? How is it calculated? (If you answer with an equation please explain the notation.)

8) What plot can be used to test the adequacy of the linear model? What are on the axis? How should the plot look like if the assumption is fulfilled and how should it look like if the assumption doesn’t fulfilled? Draw examples!

9) After fitting a linear caliobration line we see that the 95% confidence interval at x = 2 mmol/l concentration is (234, 248). What does this mean?

10) After fitting a linear calibration line we see that the 95% prediction interval at x = 2 mmol/l concentration is (234, 248). What does this mean?

**Design of experiments**

1) In a 23 designed experiment one of the factor was the temperature, the dependent variable was the yield. The lower limit of the temperature was 40 ⁰C, the upper level 50 ⁰C. After evaluating the results, the effect of the temperature was -12%. What does it mean?

2) How many experiments shoud be made to perform a 24 designed experiment with three repetitions in the center point?

3) After evaluating a designed experiment it is found that there is interaction between the temperature and the pressure. What does it mean?

4) Why is it recommended to make repetitions in the center point of a 2p design?