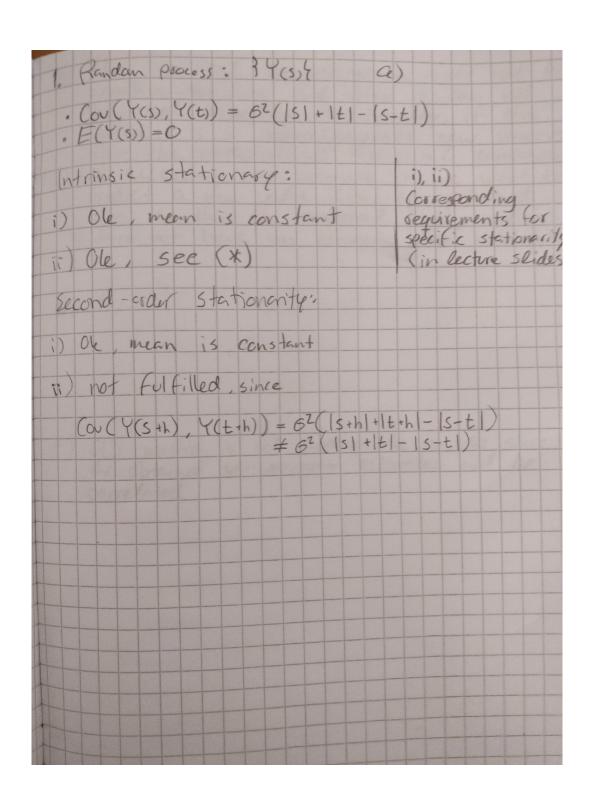
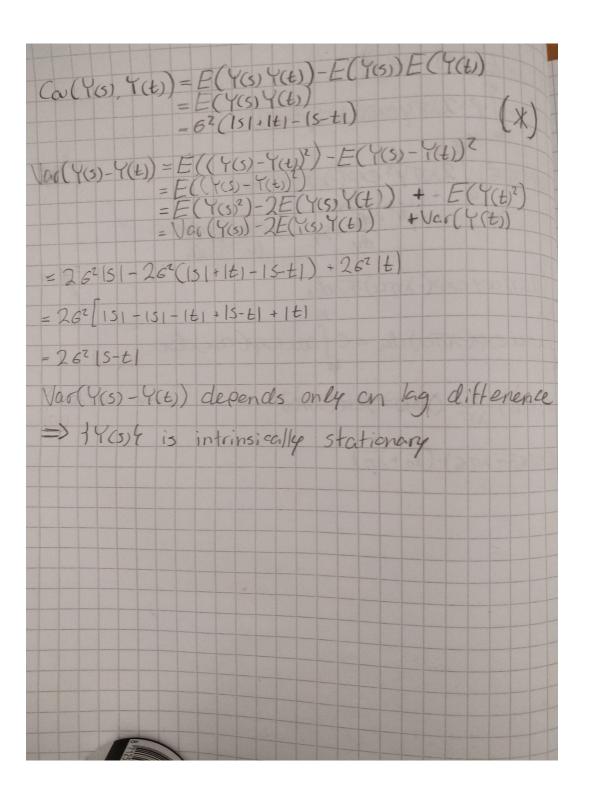
Exam answers

Tuomas Porkamaa

1.

a)





The empirical semivariogram might not satisfy the negative-definite property and hence it can not be used directly as a semivariogram. Additionally, if the interest is to predict/krige new observations, then the parametrized theoretical semivariogram model is necessary. For example, if we want to predict a new value $Z(s_0)$ at unobserved site s_0 , then the empirical semivariogram doesn't have an estimate for $\gamma(s_i-s_0)$.

c)

OLS method is not appropriate method for estimating the semivariogram parameters, since OLS assumes that the observations $\hat{\gamma}(h)$ are independent. This assumption does not hold with empirical semivariogram values. First of all Z_i 's are autocorrelated and since same Z_i 's are used to calculate $\hat{\gamma}(h)$'s, the $\hat{\gamma}(h)$'s are correlated as well. Due to this dependence property, the obtained parameter estimates $\hat{\theta}$ from OLS are not BLUE (Best Linear Unbiased Estimates) to ground truth ones.

	72 Z3 1 0 G 1 1 0 0 G	Z4 Z5 1001 000	Z ₆ 0 0 1		

4.

a)

Quadrat based methods

$$\sum (n_i - \bar{n})^2 / \bar{n}$$