LIFE DATA EPIDEMIOLOGY – possible questions for the written test

1) metapopulation modelling framework: underling concept, basic mathematical formulation
2) Markovian mobility model: formulation, assumptions and regime of approximation
3) mobility model with memory (commuting model): ingredients, assumptions, regime of approximation, mathematical formulation
4) time scale separation for SIR spread with the mobility model with memory: underling concept and mathematical calculations
5) Markovian vs. non-markovian mobility model: key differences (in the assumption, ingredients and regime of validity) between the two models
6) global invasion threshold: underling concept, key factors affecting the global invasion, mathematical formulation
7) Incidence: definition of incidence (numerator/denominator), problems and biases in the incidence calculation, examples of routine surveillance (e.g. influenza) and emerging disease surveillance (e.g. MERS).
8) impact of travel restrictions on the global spread of an epidemic: effect of travel restrictions, explanation, mathematical formulation
9) spatial propagation of epidemics in a metapopulation model: statistics of arrival times of the first case in a new patch
10) overview of human mobility data and model
11) temporal properties of networks: overview of the temporal properties of a dynamical network of contacts
12) activity driven model for temporal networks: model ingredients, model properties, mathematical formulation
13) randomised reference models (RRM) for the top-down analysis of temporal networks: key idea, examples of RRM
14) maximum likelihood: definition and theoretical considerations
15) techniques for the numerical computation of the maximum likelihood.