MO412 – Network Science University of Campinas

Homework 12

Assigned on 2020-12-26 **Due on 2021-01-04**

1. (Classic Epidemics on Bipartite Networks)

   Consider a bipartite network with two types of nodes, which we indicate as male (M) and female (F). Assume we have the same number N of nodes of each type. On this network, a pathogen can be transmitted only from a node of one type to a node of the other type. Assume that the rate of transmission from an M node to an F node, β_1, is different from the rate of transmission from an F node to an M node, β_2. Write the equations of the corresponding SI model, assuming a classical approach with homogeneous mixing. Specificaly, write the differential equations governing the growth over time of both $f(t)$, the fraction of infected F nodes over total F nodes, and of $m(t)$, the fraction of infected M nodes over N as well.

   You do not need to solve the equations, just to write them down. But please explain all the steps you take.