Series 2: epidemic models

Exercise 1. *During the lecture, we have studied the solutions of the Kermack-McKendrick model for initial conditions* $(S(0) > 0, I(0) > 0)$. *Study the solution for the following initial conditions: i)* $(S(0) = 0, I(0) > 0)$*, ii)* $(S(0) = 0, I(0) = 0)$*, and iii)* $(S(0) > 0, I(0) = 0)$. *If possible give the exact analytic solution.*

Exercise 2. *The following table gives the data from the Eyam's (a village in England) Plague of 1666.*

$Date(1666)$	$Susceptible$	$Infected$
$July3$	235	15
$July19$	201	22
$August3$	154	29
$August19$	121	21
$September3$	108	8
$September19$	97	8
$October20$	83	0

Compute the epidemic threshold.

Exercise 3. *Let assume an epidemic with the following information:* $S(0) = 250$*,* $I(0) = 50$*, and* $S^* = 100$*. What is the number of infected people at the peak of the epidemic (i.e., the maximum number of infected people).*