# Exam title

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TFY4235 - Computational physics
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**Abstract**

Short abstract

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# Results and Discussion

## 1 Problem 2A: SIR model

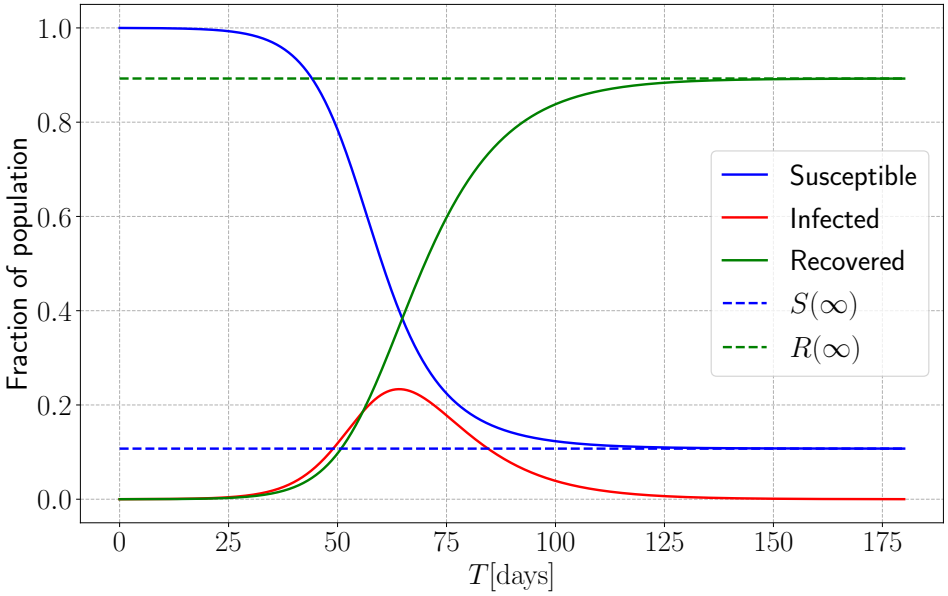


Figure 1: SIR equations with $\beta = 0.25\,\mathrm{day}^{-1}$, $\tau = 10\,\mathrm{day}$.

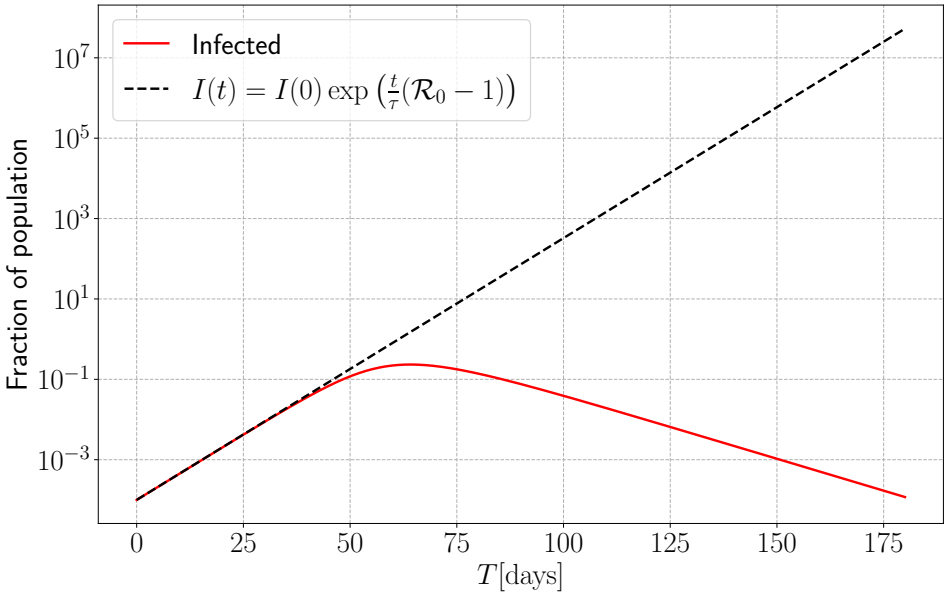


Figure 2: Infected people compared with the analytical approximation at the early stages.

## 2 Problem 2B: Stochastic SIR model

Table 1: The maximum value of $\beta$ giving a peak less than 0.2 of the infected fraction, and the minimum value of $R(0)$ (vaccinated) avoiding exponential growth.

| Parameter | value | $0.2 - \max_{t\in[0,\infty]} R(t)$ | Initial log-slope |
|---|---|---|---|
| $\beta$ | 0.28020370 | $8.319 \cdot 10^{-7}$ | — |
| $R(0)$ | 0.59987499 | — | $-1.74 \cdot 10^{-15}$ |

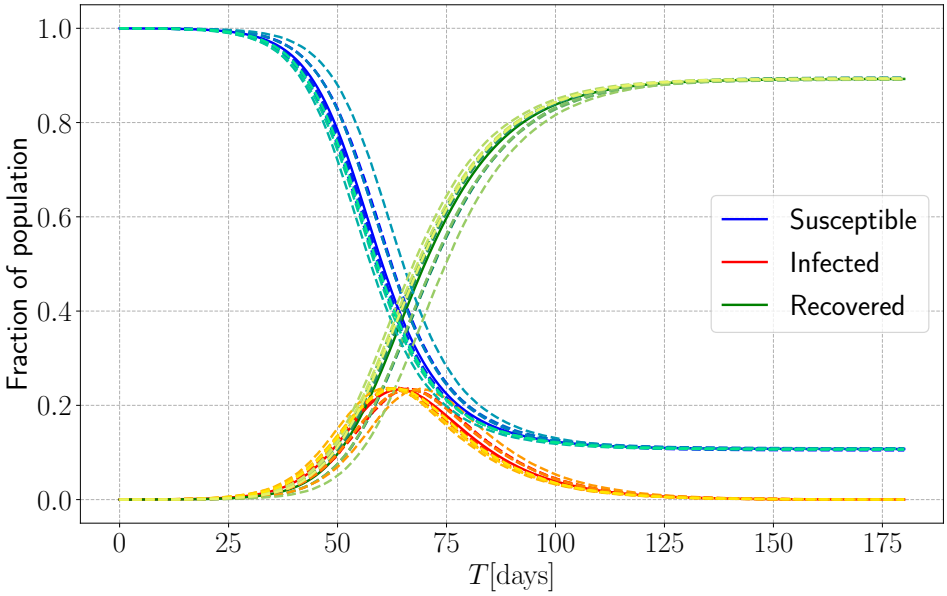


Figure 3: Solution of stochastic SIR equations with $\beta = 0.25\,\mathrm{day}^{-1}$, $\tau = 10\,\mathrm{day}$.

# 3 Problem 2C: Stochastic SEIIaR model‘

# References

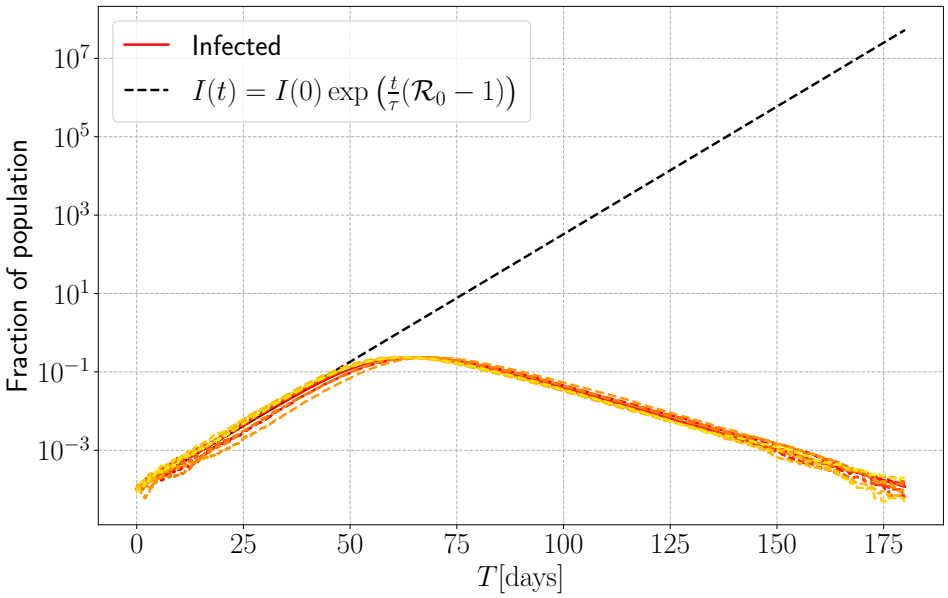


Figure 4: Infected people compared with the analytical approximation at the early stages. Stochastic and continuous model.

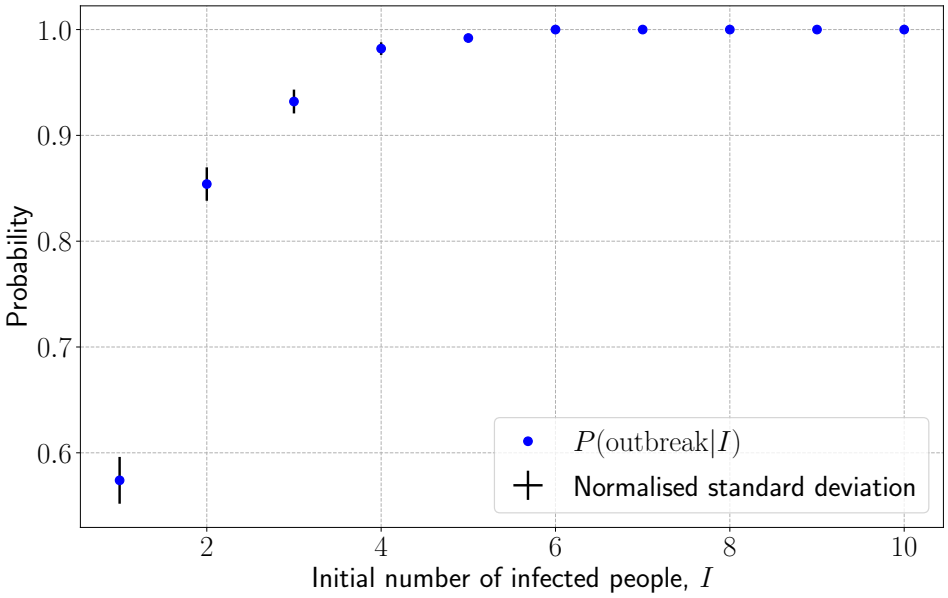


Figure 5: Probability of an outbreak as a function of initial number of infected people.

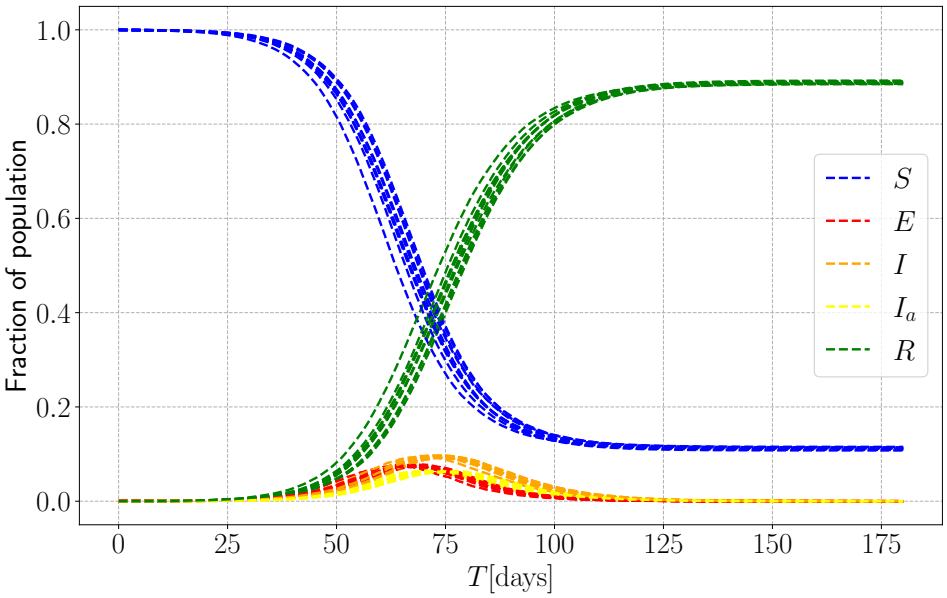


Figure 6: Solution of the stochastic SEIIaR-equations.

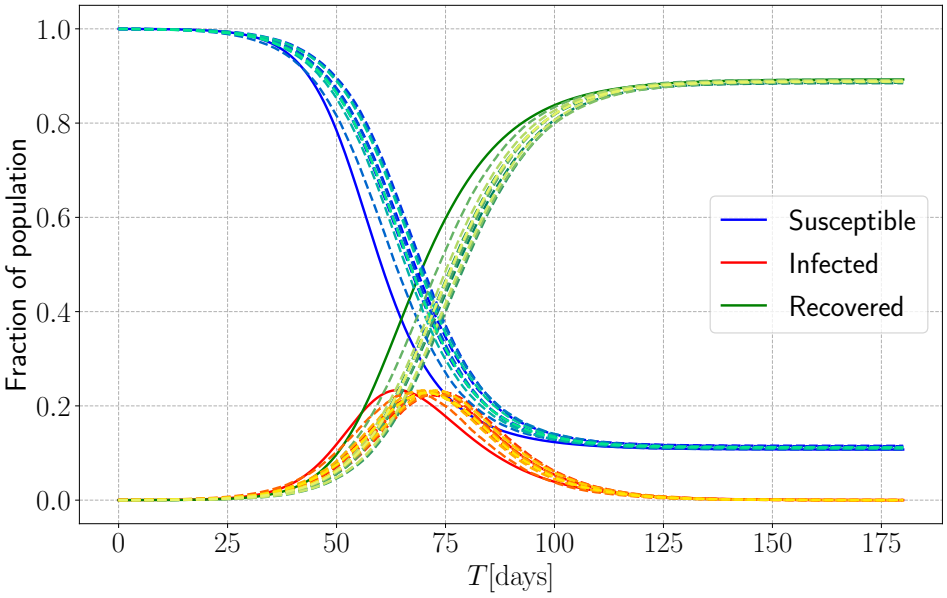


Figure 7: Comparison of the solution of the Stochastic SEIIaR-equations with the deterministic SIR-model. The number of infected people $I$ in the stochastic model is $E+I+I_a$.

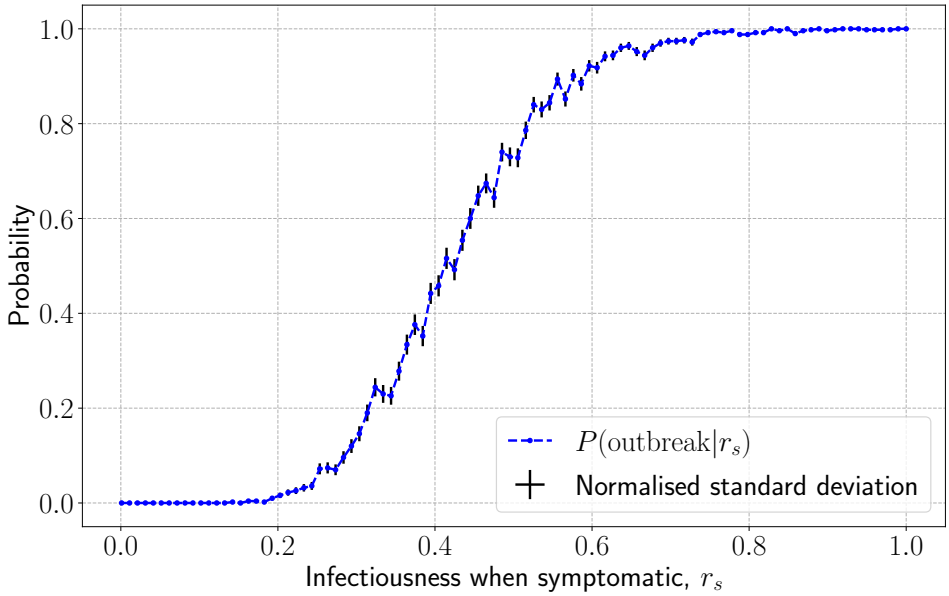


Figure 8: Probability of an outbreak as a function of $r_s$.