

Lab exercises

Set-up instructions

- Copy and paste these lines into your Console, then hit “Enter”:

```
install.packages("shiny")
install.packages("EpiModel")
EpiModel::epiweb("dcm")
```

- Under “Disease Type”, select “SIR”
- Leave all parameter values as they are, but spend a few minutes to make sure you understand what each parameter is. “Act rate” is what we’ve called the “contact rate”.

Lab part 1:

1. Adjust the parameters so that you get a *beta* value of 0.13. At day 50, how many people are in each compartment (S, I, and R)? Are these numbers logical?
2. Now change the recovery rate to 0.04 while leaving all the other parameters the same. What are the number of people in each compartment at day 50? (hint: summary tab, set “Time Step” to 50) What is the R_0 for this system? How many total people were infected by the end of the time period?
3. How many people would have to be vaccinated at the start of this simulation in order for the disease to never take hold - i.e. for each person to infected less than 1 other person. Hint, two classes ago you were given the formula that the *effective* reproductive number (R) can be determined by: $R = R_0 - (p \cdot R_0)$, where p = the proportion immune.

9. Answer question 4 using this stochastic model - how do the results compare, why is this?

10. Based on your findings from question 8, how would you respond to a hospital manager that wants to know if we should prepare for an outbreak or not?