SIR model simulation

## Load packages

library(deSolve)  
library(tidyverse)

## Set initial values

I\_init <- 20/8\*1e-6  
S\_init <- 1 - I\_init  
R\_init <- 0  
  
init <- c(S = S\_init, I = I\_init, R = R\_init)

## Set parameters

R0 <- 2.2  
pi\_r <- 1 / 8  
pi\_s <- R0 \* pi\_r  
  
parameters <- c(pi\_s = pi\_s, pi\_r = pi\_r)

## Set time frame

times <- seq(0, 200, by = 1)

## Formulate the SIR model

sir <- function(time, state, parameters) {  
  
 with(as.list(c(state, parameters)), {  
  
 dS <- -pi\_s \* S \* I  
 dI <- pi\_s \* S \* I - pi\_r \* I  
 dR <- pi\_r \* I  
  
 return(list(c(dS, dI, dR)))  
 })  
}

## Solve ODE

out <- ode(  
 y = init,  
 times = times,  
 func = sir,  
 parms = parameters  
)

## Plot pandemic progress

out\_long <- out %>%   
 as.data.frame() %>%   
 pivot\_longer(-time, names\_to = "group", values\_to = "prop")  
  
out\_long %>%   
 ggplot(aes(x = time, y = prop \* 100, color = group)) +  
 geom\_line(size = 1) +   
 theme\_light() +   
 labs(  
 x = "days",  
 y = "% of population"  
 )

