# sir-simulation

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*3/19/2020*

## R Markdown

```
#N <- 300000000
N <- 10000      # total population
T <- 100.0      # maximum elapsed time
t <- 0        # start time
V <- 8000.0      # spatial parameter
alpha <- 4.0 # rate of infection after contact
beta <- 2   # rate of cure
n_I <- 1        # initial infected population
```

```
# Compute susceptible population, set recovered to zero
n_S <- N - n_I
n_R <- 0

# Initialize results list
# times <- rep(p, )
# S <- rep(n_S, length(times))
# I <- rep(n_I, length(times))
# R <- rep(n_R, length(times))
times <- c(t)
S <- c(n_S)
I <- c(n_I)
R <- c(n_R)
```

```
# Main loop
start_time <- Sys.time()
while(t<T) {

  if (n_I == 0) {
    break
  }
  w1 <- alpha * n_S * n_I / V # v bigger => w1 smaller
  w2 <- beta * n_I
  W <- w1 + w2
  dt <- -log(runif(1)) / W
  t <- t + dt

  if (runif(1) < w1/W) {
    n_S <- n_S - 1
    n_I <- n_I + 1
  } else {
    n_I <- n_I - 1
    n_R <- n_R + 1
  }
  # S[i] <- n_S
```

```
  # I[i] <- n_I
  # R[i] <- n_R
  times <- c(times, t)
  S <- c(S, n_S)
  I <- c(I, n_I)
  R <- c(R, n_R)
}
end_time <- Sys.time()
```

```
end_time - start_time
```

```
## Time difference of 4.291547 secs
```

```
sir_df <- data.frame(t=times, S=S, I=I, R=R)
```

```
library(ggplot2)
ggplot(sir_df)+geom_line(aes(x=times,y=S), color="green")+geom_line(aes(x=times,y=I),color="red")+geom_
```