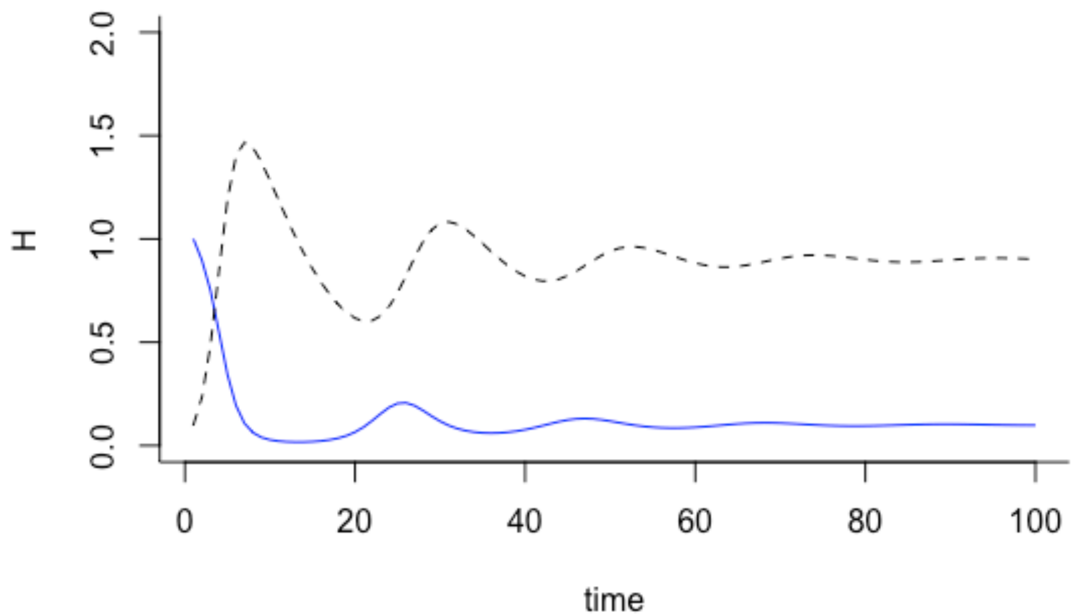
EXAM 2

1.

```
library(deSolve)

# pred prey growth function

pred_prey <- function(t, y, p) {
  H <- y[1]
  Z <- y[2]
  with(as.list(p), {
    dH.dt <- (r * H * (1 - H / K)) - (b * H * Z)
    dZ.dt <- (c * H * Z) - (m * Z)
    return(list(c(dH.dt, dZ.dt)))
  })
}

#specify parameter values and initial conditions

t <- 1:100
y0 <- c('H' = 1, 'Z' = 0.1)
p <- c('r' = 1,
       'c' = 1,
       'b' = 1,
       'm' = 0.1,
       'K' = 1)

#runs and stores solution data for the ode

sim <- ode(y = y0, times = t, func = pred_prey, parms = p, method = 'lsoda')
sim <- as.data.frame(sim)

#plots equations

plot(H ~ time, type = 'l', col = 'blue', bty = 'l', data = sim, ylim = c(0, 2))
points(Z ~ time, type = 'l', lty = 2, data = sim)
```

Humans = ____________

Zombies = ---------------



2.

```
library(deSolve)

# pred prey growth function with biocontrol

pred_prey <- function(t, y, p) {
 H <- y[1]
 Z <- y[2]
 P <- y[3]
 with(as.list(p), {
   dH.dt <- (r * H * (1 - H / K)) - (b * H * Z)
   dZ.dt <- (c * H * Z) - (m * Z) - (d * Z * P)
   dP.dt <- (e * Z * P) - (n * P)
   return(list(c(dH.dt, dZ.dt, dP.dt)))
 })
}

# specify parameter values and initial conditions

t <- 1:100
y0 <- c('H' = 1, 'Z' = 0.1, 'P' = 0.1)
p <- c('r' = 1,
```

```
     'c' = 1,
     'b' = 1,
     'm' = 0.1,
     'K' = 1,
     'd' = 1,
     'e' = 1,
     'n' = 0.1)

#runs and stores solution data for the ode

sim <- ode(y = y0, times = t, func = pred_prey, parms = p, method = 'lsoda')
sim <- as.data.frame(sim)

# plots equations

plot(H ~ time, type = 'l', col = 'blue', bty = 'l', data = sim, ylim = c(0, 2))
points(Z ~ time, type = 'l', lty = 2, data = sim)
points(P ~ time, type = 'l', lty = 2, data = sim, col = 'red')
```

Humans = ____________	Zombies = ---------------	Biocontrol = ---------------