```
##question 1c
library('deSolve')
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)))
  })
}

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

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

plot(H ~ time, data = sim, type = 'l', col = 'darkgreen', bty = 'l')
points(Z ~ time, data = sim, type = 'l', col = 'purple', lty = 2)
plot(H ~ Z, data = sim, type = 'p', col = 'darkgreen', bty = 'l')

##question 2
pred.prey.parasite <- 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)))
  })
}

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

sim.2 <- ode(y = y0, times = t, func = pred.prey.parasite, parms = p,
           method = 'lsoda')
sim.2 <- as.data.frame(sim)
```