Project 5

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predict\_death <- function(N, m, d){  
   
 ## This function takes vectors of starting populations by one year age class(N  
 ## ), instantaneous per capita death rates per year(m), and number of deaths   
 ## in the j-th week(d) as inputs. Notice that the number of deaths is not sex   
 ## specific. It iterates the model forward for length(d) weeks, and returns   
 ## the predicted number of deaths each week as a vector.  
   
 q <- 1 - exp(-m / 52)  
 Death\_week <- rep(0, length(d))  
   
 for(j in 1 : length(d)){  
 D <- .9885 \* d[j] \* (q \* N)  
 pred\_deaths <- sum(D)  
 Death\_week[j] <- pred\_deaths  
 N\_star <- N - D  
 N\_star\_previous <- c(N[1], N\_star[1 : (length(N) - 1)])  
 N\_plus <- N\_star \* 51 / 52 + N\_star\_previous / 52  
 N <- N\_plus  
 }  
 return(Death\_week)  
}

it1720uk <- read.table('lt1720uk.dat', header = T)  
death1722uk <- read.table('death1722uk.dat', header = T)  
fpop20 <- as.numeric(it1720uk$fpop20)  
mf <- as.numeric(it1720uk$mf)  
mpop20 <- as.numeric(it1720uk$mpop20)  
mm <- as.numeric(it1720uk$mm)  
death\_num <- as.numeric(death1722uk$d)[-(1 : 156)]  
predicted\_deaths\_f <- predict\_death(fpop20, mf, death\_num)  
predicted\_deaths\_m <- predict\_death(mpop20, mm, death\_num)  
predicted\_deaths <- predicted\_deaths\_f + predicted\_deaths\_m  
real\_deaths <- death1722uk$deaths[-(1 : 156)]  
excess\_deaths <- real\_deaths - predicted\_deaths