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library(numDeriv)
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```
library(matlib)
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```
dfp <- function(f, x, tol) {  
  n <- length(x)  
  v <- diag(n)  
  g <- function(a) {f(x-a*grad(f,x))}  
  step <- golden(g,0,5,tol)  
  new.x <- x - step * grad(f, x)  
  repeat {  
    s <- grad(f,new.x) - grad(f,x)  
    r <- new.x - x  
    ma <- t(r) %*% s  
    a <- (r %*% t(r))/ma[1,1]  
    mb <- t(s) %*% v %*% s  
    b <- -(v %*% s %*% t(s) %*% v)/mb[1,1]  
    v <- v + a + b  
    x <- new.x  
    new.x <- x - v %*% grad(f,x)  
    new.x <- new.x[,1]  
    dist <- dist(rbind(new.x,x))  
    if (dist(rbind(new.x, x)) < tol) {  
      return(new.x)  
    }  
  }  
}
```