```r
library(numDeriv)

cauchy.golden <- function(f, x, tol) {

        repeat {

                g <- function(a) {f(x - a * grad(f,x))}

                step <- golden(g,0,5,tol)

                new.x <- x - step * grad(f, x)

                if (dist(rbind(new.x,x)) < tol) {

                        return(new.x)

                }

                x <- new.x

        }

}
```