504HW2_Leibert

Newton's Method

```
MySqrt<-function(a){

    if (a == 0 ) { stop("Root is 0") }
    if (a < 0 ) { stop("Positive Numbers only") }

    fx<-function(x ){(x^2)-a}
    dfdx<-function(x){2*x}

    Xi<-a;
    iterations<-0

    repeat{
        xi<-Xi
        Xi<-Xi-(fx(Xi)/dfdx(Xi))
        iterations<-iterations+1
        if( abs(Xi-xi) < 10^-9 ) {break}
    }

    print(Xi);print(iterations)
    print(paste0("R sqrt function: ",sqrt(a))) }

MySqrt(1000)
```

```
## [1] 31.62278
## [1] 10
## [1] "R sqrt function: 31.6227766016838"
```

Bisection

```
MySqrt<-function(a){

    if (a == 0 ) { stop("Root is 0") }
    if (a < 0 ) { stop("Positive Numbers only") }

    fx<-function(x ){(x^2)-a}

    XL<-0
    XR<-a+1
    iterations<-0

    repeat{
        XM<- (.5 * (XL + XR))
        ifelse(fx(XM) > 0,XR<-XM,XL<-XM)
        iterations<-iterations+1
        if( abs(XR-XL) < 10^-9 ) {break}
    }

    print(XM);print(iterations)
    print(paste0("R sqrt function: ",sqrt(a))) }
```

```
MySqrt(1000)
```

```
## [1] 31.62278
## [1] 40
## [1] "R sqrt function: 31.6227766016838"
```

{uniroot}

```
MySqrt<-function(a){

    if (a == 0 ) { stop("Root is 0") }
    if (a < 0 ) { stop("Positive Numbers only") }

    fx<-function(x ){(x^2)-a}

    print(uniroot( fx, c(0,a) )$root)
    print(uniroot(  fx, c(0,a)  )$iter)
    print(paste0("R sqrt function: ",sqrt(a))) }

MySqrt(1000)
```

```
## [1] 31.62277
## [1] 15
## [1] "R sqrt function: 31.6227766016838"
```