

Week 9 Determinant and Sgn Functions

Knitr file of the sgn function and determinant:

Simple sgn function, returning 1 if an even number is passed and -1 if an odd is passed to it

```
sgn <- function(n){  
  return((-1)^(n))  
}
```

Determinant function, first checks if the matrix has one column, in which case it returns the only entry (this seems easier than solving for a 2x2 at the end, etc.) as the determinant of a 1x1 matrix is that number. Then it finds the sum of all the determinant, utilizing the sgn function to decide whether they are +/-, multiplying the sgn times the current entry, and finally finding the determinant of whatever matrices are left.

```
determinant <- function(A){  
  if(ncol(A)==1){  
    return(A[1,1])  
  }else{  
    return(do.call(sum, lapply(1:ncol(A), function(i) sgn(i)*A[1,i] * determinant(A[-1,-i,drop=F]))))  
  }  
}
```

```
noninvert <- matrix(c(1,2,3,4,5,6,7,8,9), byrow=T, ncol=3)  
invert <- matrix(c(1,2,3,0,2,3,0,0,4), byrow=T, ncol=3)
```

A singular matrix:

```
determinant(noninvert)
```

```
## [1] 0
```

An upper triangle matrix (to make demonstration easier):

```
determinant(invert)
```

```
## [1] 8
```