Lab 7

Problem 1: Webster, Gunst, and Mason (WGM) Data Set

(a) Normalize the data set by subtracting the associated mean and dividing by the square root of (n−1) × the sample variance of each variable.

```
nrm <- function(d) { scale(d, center = TRUE, scale = sqrt((nrow(d) - 1) * apply(d, 2, var)))
}
nd <- nrm(wgm_data)
```

(b) Find the VIFs.

```
library(car)
vif_res <- vif(lm(y ~ ., data = wgm_data))
print(vif_res)
```

(c) Find the condition number.

```
cn <- kappa(as.matrix(wgm_data))
print(cn)
```

(d) Find the eigenvectors and verify if it matches with the eigenvectors given in Table 9.6 of Montgomery Book.

```
eig_res <- eigen(cov(nd))
print(eig_res$vectors)
```

Problem 2: Find variance decomposition proportions for the WGM data.

```
vif_decomp <- vif(lm(y ~ ., data = wgm_data))
print(vif_decomp)
```