```
#########

######### Met Office

#########



#read NASA yearly mean temperature

library(readxl)

met.df<-read.csv(file.choose(), header=TRUE, sep=",")

str(met.df)



#decadal trends: year of 1950-2003 - year of 1940-1993

met_decade_diff <- met.df$Yearly.Mean[101:154] - met.df$Yearly.Mean[91:144]


#fit the normal distribution to the decadal trends

met_decadal_dist <- fitdist(met_decade_diff, "norm")

met_decadal_dist

plot(met_decadal_dist)

met_dist_mean <- met_decadal_dist$estimate[1] #mean

met_dist_std <- met_decadal_dist$estimate[2] #std



#decadal trends of 1994-2004, 1995-2005, ... , 2009-2019
```

```
met_latest <- met.df$Yearly.Mean[155:170] - met.df$Yearly.Mean[145:160]
#met.df[155:170,]
#met.df[145:160,]
#met_latest

#compute z score for recent decadal trends and write the output to a .csv file
met_z_score <- (met_latest - met_dist_mean)/met_dist_std
met_z_score
write.csv(met_z_score, 'MET Z score.csv')



#########
######### NASA
#########

#read NASA
nasa.df<-read.csv(file.choose(), header=FALSE, sep=",")

#transform NASA data into matrix and then ts form
to_matrix<-function(x) {
  m<-as.matrix(x[-1,-1])
  rownames(m)<-x[-1,1]
  colnames(m)<-x[1,-1]
```

```
  m}


nasa.mx <- to_matrix(nasa.df)

nasa.mx <- apply(nasa.mx, 2, as.numeric)


#decadal trends: year of 1950-2003 - year of 1940-1993

decade_diff <- yrly_mean[71:124,2]-yrly_mean[61:114,2]

decade_diff <- cbind(yrly_mean[71:124,1], decade_diff)


#fit the normal distribution to the decadal trends

decadal_dist <- fitdist(decade_diff[,2], "norm")

dist_mean <- decadal_dist$estimate[1] #mean

dist_std <- decadal_dist$estimate[2] #std


#decadal trends of 1994-2004, 1995-2005, ... , 2009-2019

#yrly_mean[125:140,]

#yrly_mean[115:130,]

latest <- yrly_mean[125:140,2]-yrly_mean[115:130,2]

latest


z_score <- (latest-dist_mean)/dist_std

z_score

write.csv(z_score, 'NASA Z score.csv')
```