1. (a) The mean 11794.86 is much larger than the median 6248.00, as expected due to the strong skewness to the right.

```
System <- read.csv("system.csv")
Time <- System[,1]
c(mean(Time),median(Time))
[1] 11794.86  6248.00
```

(b) . There are three outliers 78811, 43003 and 34867 above the upper bound 32658. Or if you use the `fivenum` command for Q_3 and IQR, you find $ub = 33259.5$.

```
ub = quantile(Time,0.75)+1.5*IQR(Time)
ub
  75%
32658
Time[Time>ub]
[1] 78811 43003 34867
```

(c) After omitting the outliers, the new mean 9214.085 is about 22% lower then the original mean 11794.86 while the new median 5732.000 is about 9% lower than the original median 6248.00. The new standard deviation 8559.735 is about 39% lower then the original standard deviation 14055.90 while the new IQR 9874.000 is about 17% lower than the original IQR 11830.00. So the median and IQR are less sensitive measures of centre and spread than the mean and standard deviation respectively.

```
c(mean(Time[Time<=ub]),median(Time[Time<=ub]),sd(Time[Time<=ub]),
   IQR(Time[Time<=ub]))
[1] 9214.085 5732.000 8559.735 9874.000
c(mean(Time),median(Time),sd(Time),IQR(Time))
[1] 11794.86  6248.00 14055.90 11830.00
```