

Homework Week #12

1. Find the outliers by boxplot for the given data set as follows.

4.496 3.094 5.065 4.882 3.640 3.758 5.017 2.500 6.079 3.411 0.715 3.602 3.916 4.427 3.235 4.373 1.679  
3.800 3.820 0.622 5.640 2.683 2.646 5.624 7.321 2.630 4.008 5.522 2.989 1.513 1.738 2.848 4.339 3.849 2.507  
4.915 4.076 2.834 5.342 4.277 1.926 2.373 3.388 3.234 3.094 3.471 3.769 3.627 4.075 4.925 5.061 4.559 2.644  
1.622 2.785 6.241 4.302 4.684 5.106 5.558 50.33 0.045 4.690 0.980 2.042 1.985 2.131 4.470 3.309 6.467 3.678  
1.474 2.273 3.588 3.641 0.843 4.765 4.514 3.398 5.027 3.057 0.937 3.846 2.674 2.905 3.619 4.036 4.831 2.413  
5.009 4.262 3.576 2.016 0.649 0.927 1.643 4.859 0.922 3.847 5.225 1.426 4.381

2. a. For the data in #1, compare the various estimates of the center parameter (including M-estimators) and scale parameter (including robust estimators) given in Section 5.5.  
b. What is your choice of the estimates of center and scale? Why?  
c. Use qqplot to find out the possible distribution that the data are from (you may also check Gamma, Weibull, Uniform, Exponential, log-normal, etc.).  
d. Carry out proper tests to justify the choice of distribution you selected in 2.c.  
e. What is the estimates of location and scale parameters in 2.d?  
f. Repeat 2.c, 2.d and 2.e after deleting outliers.
3. Carry out a simulation study on the standard deviations of the sample mean, 0.05-trimmed mean,  $\text{mad}()$  and  $S$  (where  $S$  is the sample standard deviation) as follows. The sample size is 100 and the replication is 1000 under a double exponential distribution. Compute the sample means and sample standard deviations of these four estimates in 1000 replications. Given these results, what are the possible values of the  $\text{ARE}(0.05\text{-trimed mean, sample mean})$  and  $\text{ARE}(\text{mad, } S)$  under the double exponential distribution,
4. Derive the breakdown points of the estimator (of standard deviation)  $\text{IQR}$  (see the textbook) and  $\text{MAD}/0.6745$ .
5. Hw 5.5.2 around page 68 in my notes.