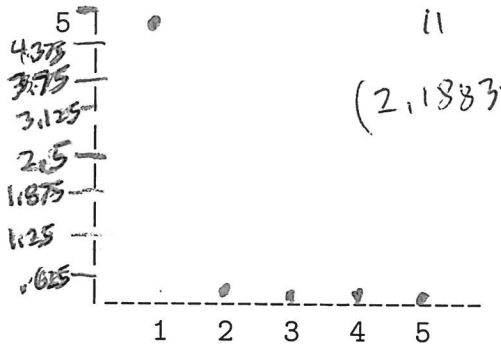
Math 583 Quiz 4 Fall 2012 Name_____

```
prcomp(crabs[,4:8],scale=T)
Standard deviations:
[1] 2.18834065 0.38946785 0.21594669 0.10552420 0.04137243
Rotation:PC1        PC2         PC3          PC4         PC5
FL 0.4520437  0.1375813  0.53076841  0.696923372  0.09649156
RW 0.4280774 -0.8981307 -0.01197915 -0.083703203 -0.05441759
CL 0.4531910  0.2682381 -0.30968155 -0.001444633 -0.79168267
CW 0.4511127  0.1805959 -0.65256956  0.089187816  0.57452672
BD 0.4511336  0.2643219  0.44316103 -0.706636423  0.17574331
```

1) Shown above is PCA output using the correlation matrix for Venables and Ripley (2003) crab data. The variables were FL=frontal lobe size, RW=rear width, CL=carapace length, CW=carapace width, and BD = body depth measured in mm. The DD plot was linear about the identity line. The "standard deviations" line corresponds to the square roots of the eigenvalues. The Rotation matrix gives the 5 eigenvectors $\hat{e}_j$ for $j = 1, ..., 5$.

a) Make a scree plot. 4.7888, .1517, .04663, .011135, .001711



$(2.18834)^2$

sharp bend!

b) What proportion of the trace is explained by the first principal component?

$\frac{4.7888}{5} = 0.9578$

b) Which principal component corresponds to

i) RW, PC2

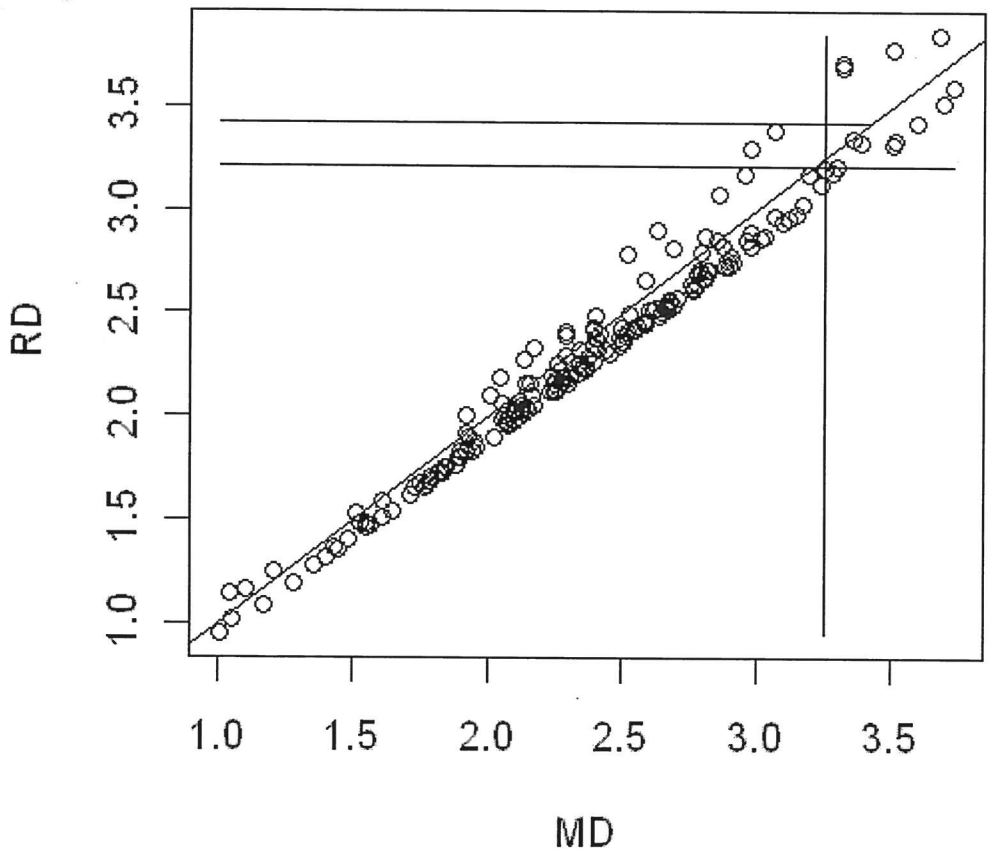
ii) an average of the 5 variables, PC1

iii) FL − BD? PC4

iv) a linear combination of CL and CW? PC5

75

PC3 is LC of FL CL CW BD



ddplot4(Seatbelts[,1:6])

$cuplim 93.125% 3.251247 , $ruplim 93.125% 3.209553, $mvnlim[1] 3.422047

2) ~~UKDriverDeaths~~ Seatbelts is a time series giving the monthly totals of car drivers in Great Britain killed or seriously injured Jan 1969 to Dec 1984. Compulsory wearing of seat belts was introduced on 31 Jan 1983. The six variables were `DriversKilled`=car drivers killed, `drivers`= drivers killed or seriously injured, `front`=front-seat passengers killed or seriously injured, `rear`=rear-seat passengers killed or seriously injured, `Kms`=distance driven, and `PetrolPrice` = petrol price. What is the nonparametric region in the DD plot shown above?

$\{\underline{x} : MD_{\underline{x}} \leq 3.25\}$ so area to the left of MD = 3.25

25