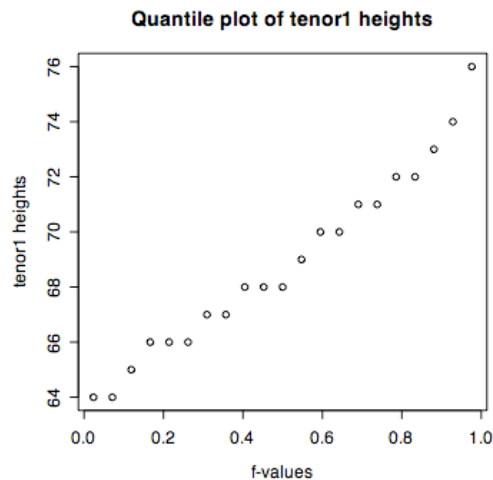Quantile Plots, Q-Q Plots, and Normal Q-Q Plots:
(Note: R-code for these demos is at end of notes – try it!)
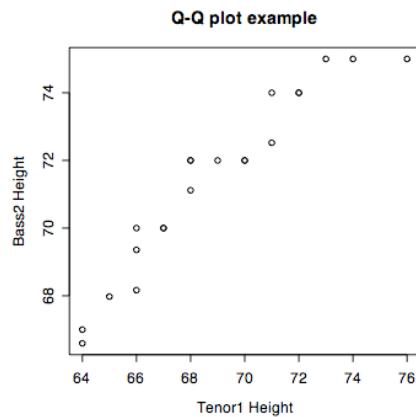
Data $\{X_i: i=1,\ldots n\}$
Quantile plot is $X_{(i)}$ vs f_i, where $X_{(i)}$ are the sorted X_i and $f_i = (i-0.5)/n$
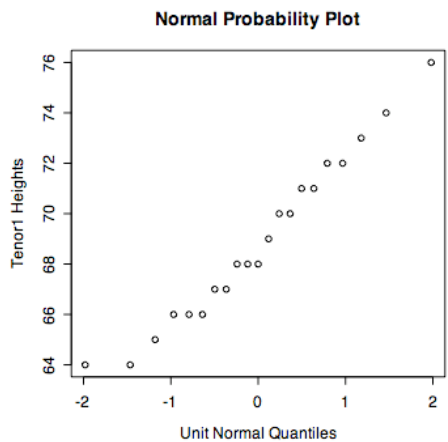
Example for Tenor1 Heights:

Q-Q plot for Tenor1 Heights and Bass2 Heights (Like Fig 2.3 p 22): One uses sorted Heights samples and for the smaller sample (n=21) specify f-values (1:21-0.5)/21, then plot actual sorted Tenor1 Heights against estimated Bass 2 Height quantiles [in R use b2=quantile(b,f)]
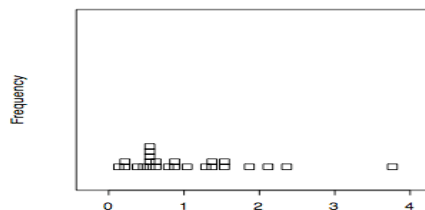

What is a Normal Q-Q Plot? Do it for a single variable (like Tenor1 Heights).

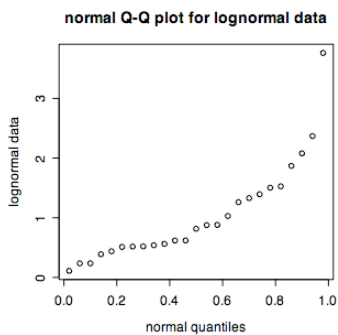Plot sorted Tenor1 Heights against Theoretical Standard Normal Quantiles.   (pp 30-31)

See plot below. Note intercept = 68.9 = mean and slope = 3.33 = sd.

Normal Probability Plot

Skewness: Here is some "lognormal: data

What does the normal probability plot for this right-skewed data look like?

normal Q-Q plot for lognormal data

more on this see pp 44-46.

R-code for today's demos:

```
> getwd()
[1] "/Users/weldon/Desktop/Desktop Teaching/STAT 400"
> tenor1.df=read.table("tenor1.txt")
> bass2.df=read.table("bass2.txt")
> tenor1ht=tenor1.df$V2
> tenor1ht
 [1] 69 72 71 66 76 74 71 66 68 67 70 65 72 70 68 64 73 66 68 67 64
```

```
> tenor1ht=sort(tenor1.df$V2)
> bass2ht=sort(bass2.df$V3)
> bass2ht
 [1] 66 67 67 68 68 69 70 70 70 70 71 72 72 72 72 72 72 72 74 74 74
[22] 74 75 75 75 75
> length(tenor1ht)
[1] 21
> f=(1:21-0.5)/21
> bq=quantile(bass2ht,f)
> tq=quantile(tenor1ht,f)
> plot(f,tenor1ht,xlab="f-value",ylab="Tenor1 Heights", main="Quantile plot")
> plot(tenor1ht,bq,xlab="Tenor1 Heights", ylab="Bass2 Heights", main="Q-Q Plot")
> nq=qnorm(f)
> plot(nq,tenor1ht,ylab="Tenor1 Heights", xlab="normal quantiles",main="Normal Q-Q
Plot")
> logn=rlnorm(25)
> dotplot(logn)
> f=(1:25-0.5)/25
> logn=sort(rlnorm(25))
> nq=qnorm(f)
> tdata=sort(rt(25,3))
> plot(nq,tdata,xlab="z-value",ylab="t(3) Data", main="Normal Plot for t(3) Data")
> plot(nq,logn,xlab="z-value",ylab="Lognormal Data", main="Normal Plot for
Lognormal Data")
```