Data File Used in this Analysis:

```
# Math 3070 - 1   Age of Black Forest Mineral      June 2, 2011
# Treibergs
#
# Data taken from Larsen & Marx, "An Introduction to Mathematical Statistics
# and its Applications, 4th. ed.," Pearson/Prentice Hall 2006. In D. McIntyre's
# 1963 study of dating rocks, the age of several samples of a particular mineral
# of known age found in the Black Forest were measured using Potassium-Argon
# dating.
# The question is how much variability is inherent in the dating method?
# The dates are in millions of years.
EstAge
249
254
243
268
253
269
287
241
273
306
303
280
260
256
278
344
304
283
310
```

R Session:

```
R version 2.10.1 (2009-12-14)
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```
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[R.app GUI 1.31 (5538) powerpc-apple-darwin8.11.1]

[Workspace restored from /Users/andrejstreibergs/.RData]

> tt <- read.table("M3074BlackForestdata.txt",header=T)
> tt
   EstAge
1      249
2      254
3      243
4      268
5      253
6      269
7      287
8      241
9      273
10     306
11     303
12     280
13     260
14     256
15     278
16     344
17     304
18     283
19     310

> s2 <- var(EstAge); s2
[1] 733.4327

> n <- length(EstAge); n
[1] 19

> # Two sided CI for sigma^2. (n-1)*S^2/sigma^2 has chi sq dist with df=n-1
> #  Do it at alpha=.05 level.
>
> alpha <- .05
> chi2a2 <- qchisq(alpha/2,df=n-1); chi2a2
[1] 8.308339
> chi21ma2 <- qchisq(alpha/2,df=n-1,lower.tail=F); chi21ma2
[1] 31.33573
>
> # two sided CI for sigma^2
> c( (n-1)*s2/chi21ma2, (n-1)*s2/chi2a2)
[1]   421.3015 1588.9806
>
> # two sided CI for sigma
```

```
> c( sqrt((n-1)*s2/chi21ma2), sqrt((n-1)*s2/chi2a2))
[1] 20.52563 39.86202
> # an estimate on the precision of the method.
>
> # Check to see if data is reasonably normal.
> # Needed for dist of S^2 to be chisq with df = n-1
> y <- (EstAge-mean(EstAge))/sd(EstAge)
> qqnorm(y,main="Normal QQ plot of Estimated Age",ylab="Standardized Estimated Age")
> abline(0,1,col=2)
>
> # Normal QQ plot is reasonably linear so no strong evidence of non-normal.
```

Normal QQ plot of Estimated Age