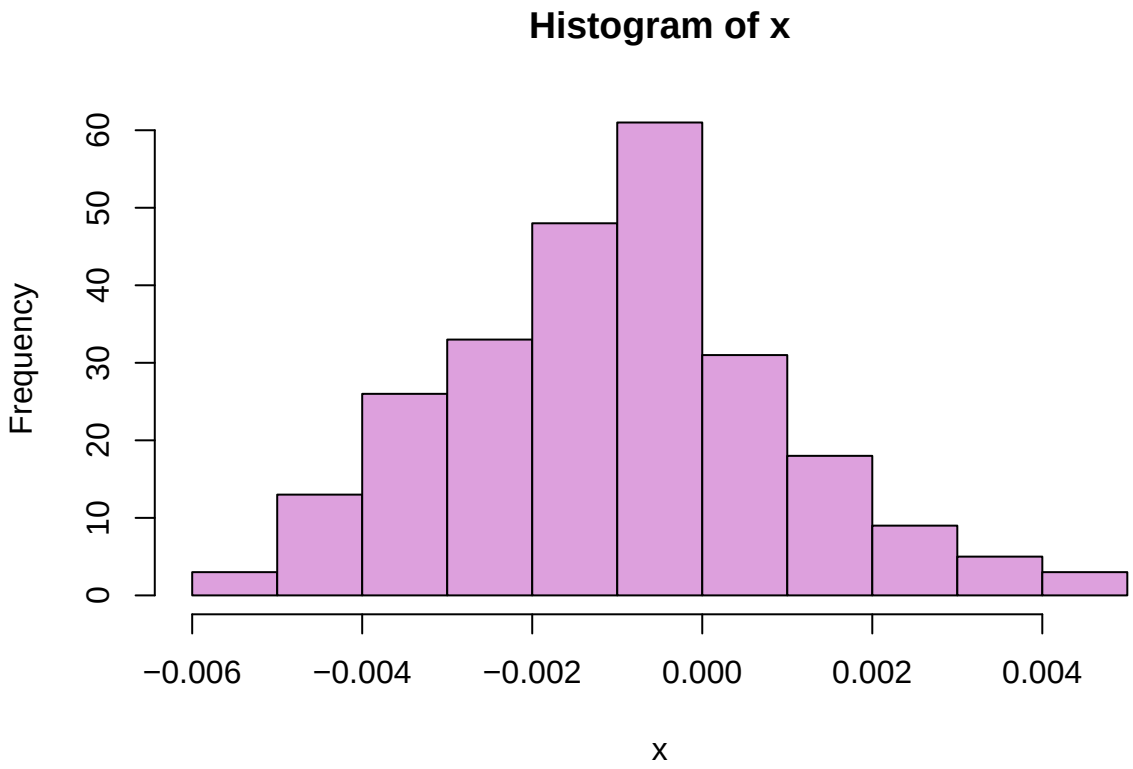
ESD-FYS - module 4-2 - exercises - suggested answers

Component variation: Resistor Read in data:

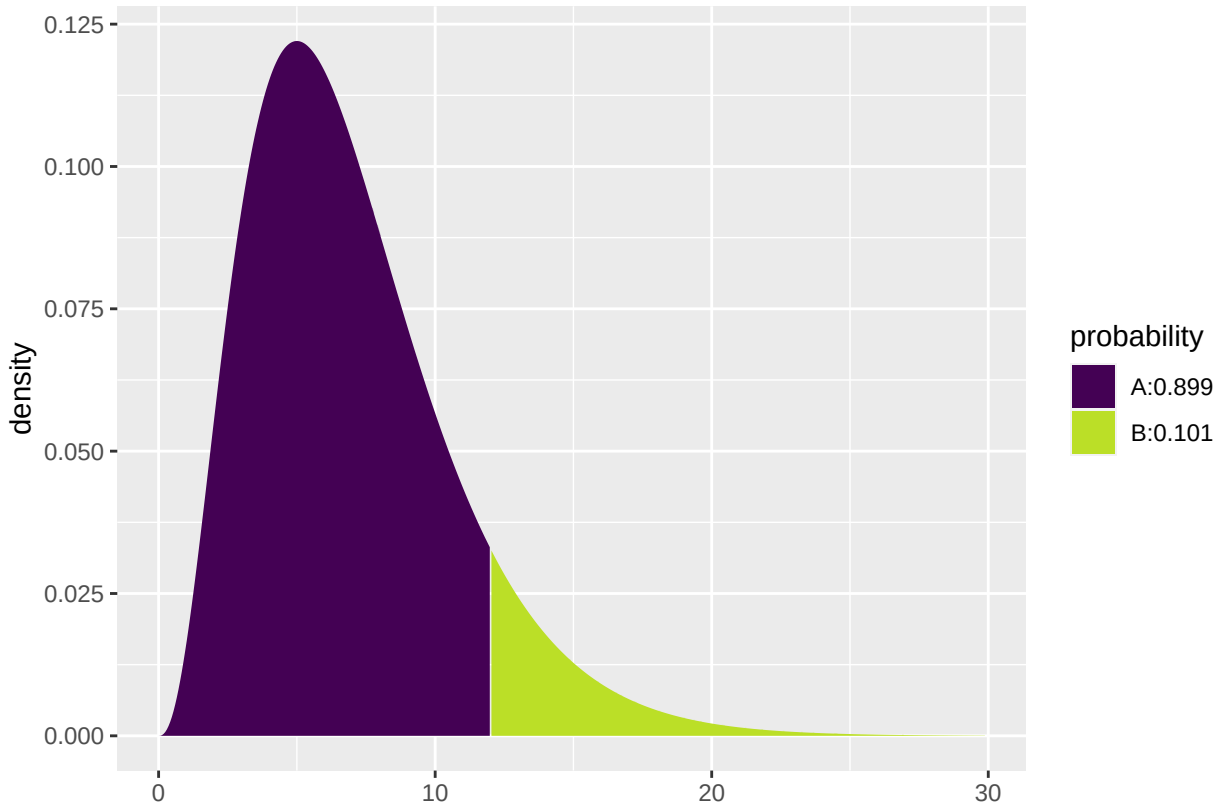
```
R1000=read.csv(url("https://asta.math.aau.dk/datasets?file=Ohm.txt"))[,2]
```

Investigate whether it is realistic to assume normality of - `ln_Error=log(R1000/1000)`.

```
x=log(R1000/1000)
m=mean(x)
s=sd(x)
histogram=hist(x,breaks="FD",col="plum")
```

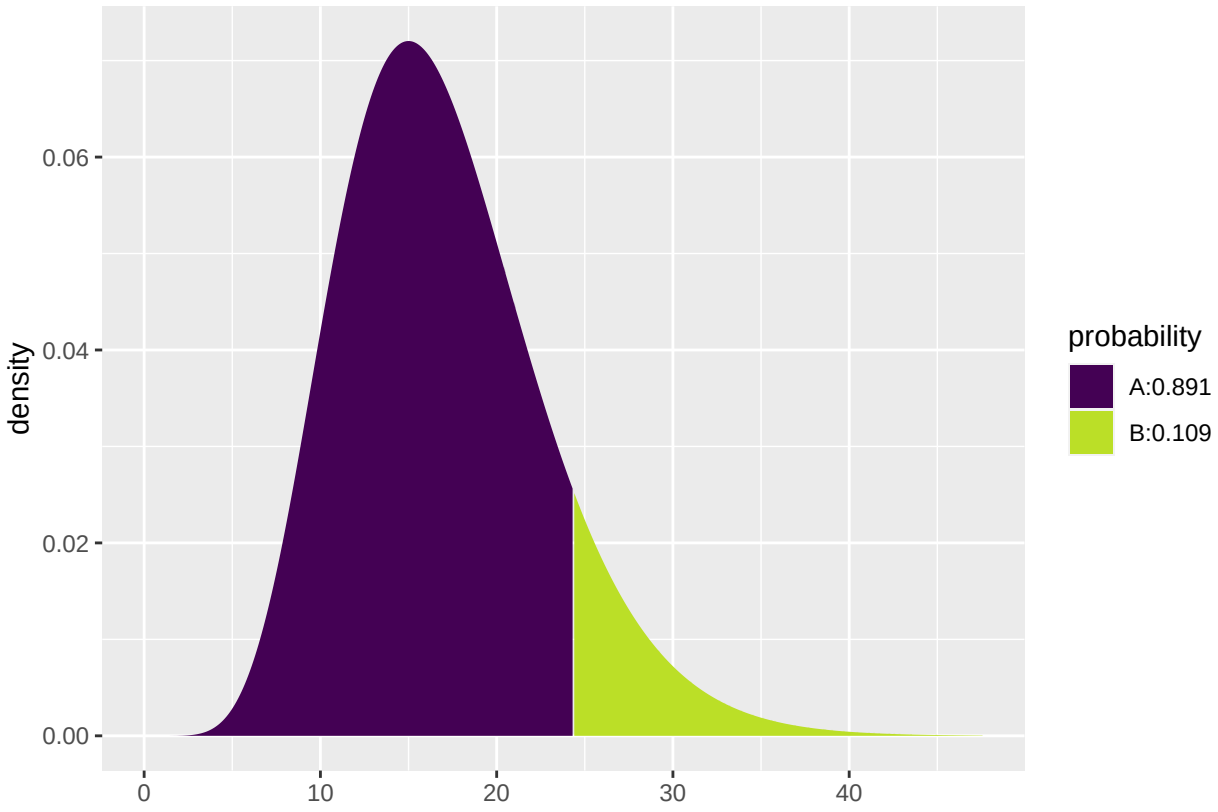



```
B=10
cut_values=qnorm((0:B)/B,m,s)
expected=length(x)/B
observed=table(cut(x,cut_values))
xsquared=sum((observed-expected)^2)/expected
df=B-3
pdist("chisq",xsquared,df=df)
```




```
## [1] 0.8994411
```

```
x=read.delim("https://asta.math.aau.dk/datasets?file=windSpeed.txt",header=FALSE)[,1]
intercept=-2.82
k=slope=1.78
lambda=exp(-intercept/k)
B=20
cut_values=qweibull((0:B)/B,shape=k,scale=lambda)
expected=length(x)/B
observed=table(cut(x,cut_values))
xsquared=sum((observed-expected)^2)/expected
df=B-3
pdist("chisq",xsquared,df=df)
```



Wind data

```
## [1] 0.8910921
```

```
observed=c(98,162,180,60)
rel=c(3,5,6,2)
expected=sum(observed)*rel/sum(rel)
expected
```

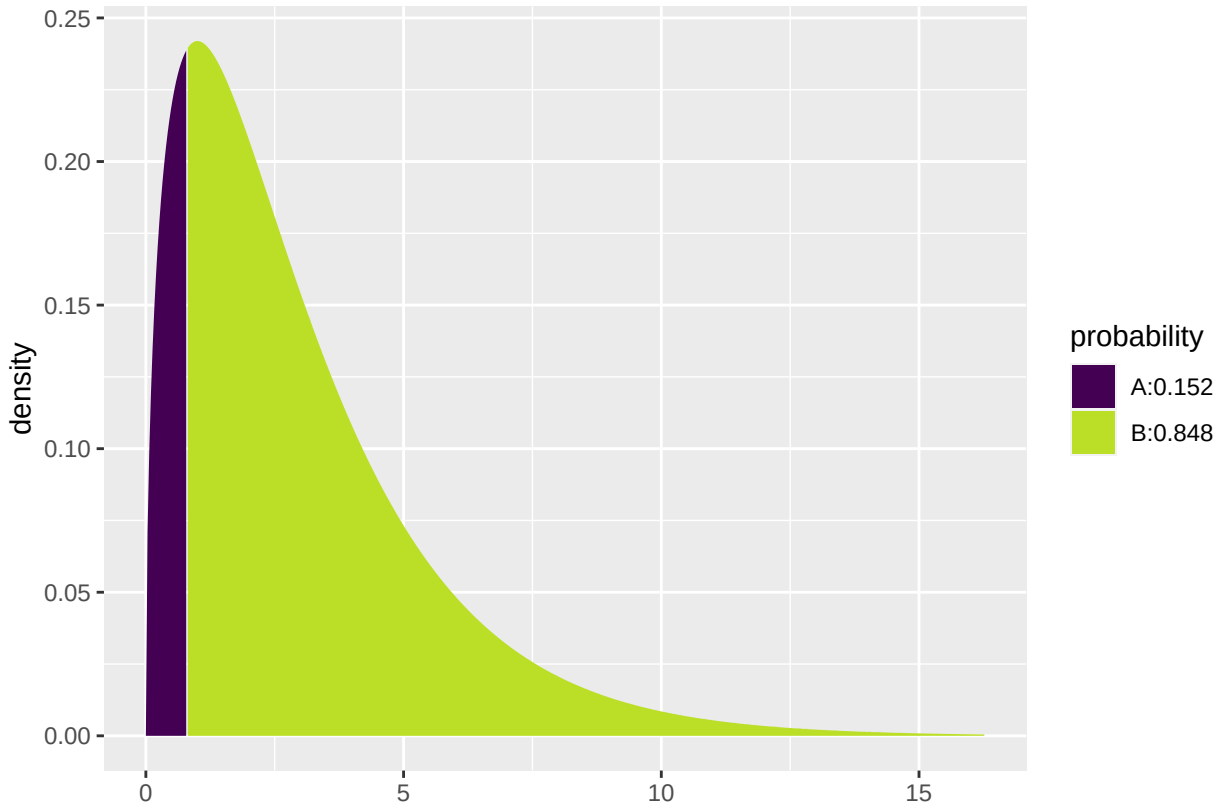
Excercise 10.79 in WMM.

```
## [1]  93.75 156.25 187.50  62.50
```

```
xsquared=sum((observed-expected)^2/expected)
xsquared
```

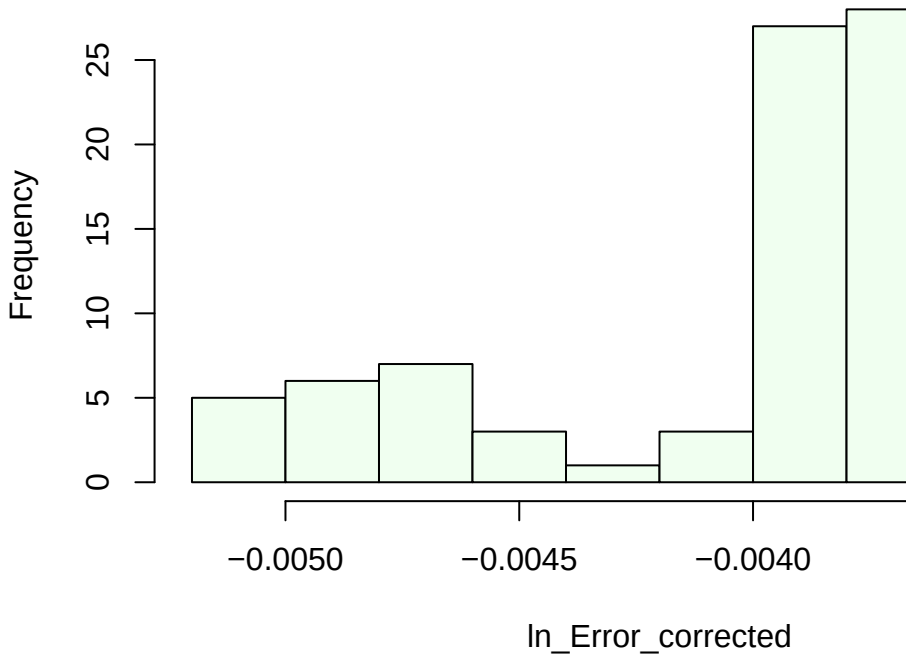
```
## [1] 0.8042667
```

```
df=3
pdist("chisq",xsquared,df=df)
```




```
## [1] 0.1515538
```

```
Cap100=read.table(url("https://asta.math.aau.dk/datasets?file=instrument_variation_100nF_1procent.txt"))
load("../ab.RData")
ln_Error_corrected=(log(Cap100/100)-ab[1])/ab[2]
hist(ln_Error_corrected,breaks="FD",col="honeydew")
```



Another type of measurement variation.

```
library(mclust)
fit=Mclust(ln_Error_corrected,2,"E")# 2 clusters; "E"qual variances
pr=fit$parameters$pro[1]
pr
```

```
## [1] 0.2177839
```

```
means=fit$parameters$mean
means
```

```
##           1           2
## -0.004848593 -0.003722159
```