**Solution for R-exercise 1**

1. y=trees$Volume

****

**b.**

R-code:

N=31

n=10

s = sample(1:N,n)

ybar=mean(y[s])

se=sqrt(var(y[s])\*(N-n)/(N\*n))

CI=ybar+qnorm(c(0.025,0.975))\*se

CI

Fikk: s

 [1] 12 18 5 8 16 13 28 1 10 27

ybar=27.32

se=4.22

CI

[1] 19.04734 35.59266

**c.**

#function for relative frequency and fitted normal density:

Tilpasning = function(b,n,N)

{

ybar=numeric(b)

for (k in 1:b){

s=sample(1:N,n)

ybar[k]=mean(y[s])

}

hist(ybar,seq(min(ybar)-0.5,max(ybar)+0.5,0.5),prob=TRUE)

x=seq(mean(ybar)-4\*sqrt(var(ybar)),mean(ybar)+4\*sqrt(var(ybar)),0.05)

z=dnorm(x,mean(ybar),sqrt(var(ybar)))

lines(x,z)

}

> Tilpasning(1000,10,31)

> Tilpasning(1000,15,31)

> Tilpasning(1000,20,31)

n=10



**n=15**

****

**n=20**

****

**d.**

>simt = function(b,n,N=31)

+ {

+ ybar=numeric(b)

+ se=numeric(b)

+ for (k in 1:b){

+ s=sample(1:N,n)

+ ybar[k]=mean(y[s])

+ se[k]=sqrt(var(y[s])\*(N-n)/(N\*n))

+ }

+ sum(mean(y)<ybar+1.96\*se)-sum(mean(y)<ybar-1.96\*se)

+ }

> simt(1000,10)

[1] 896

> simt(1000,15)

[1] 920

> simt(1000,20)

[1] 928

Hence, estimated coverages are 89.6% for n=10, 92.0% for n=15, and 92.8% for n=20.