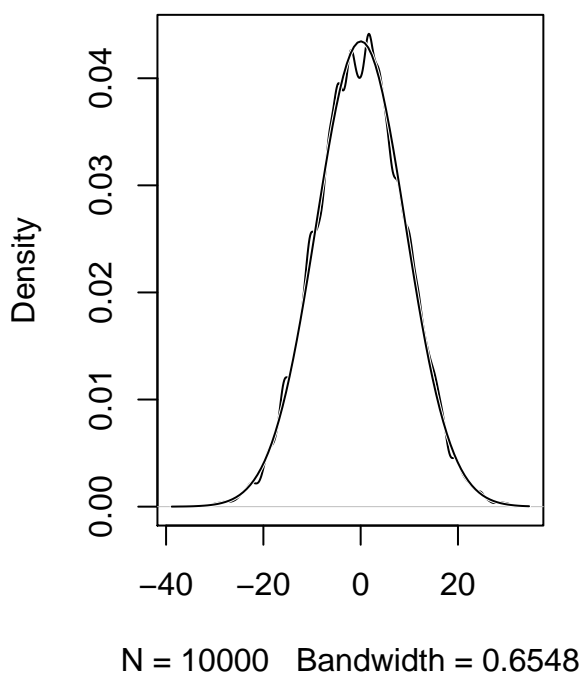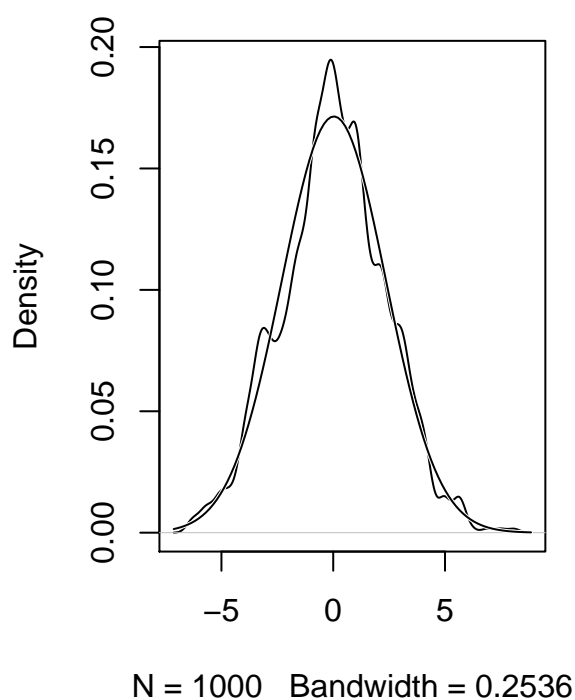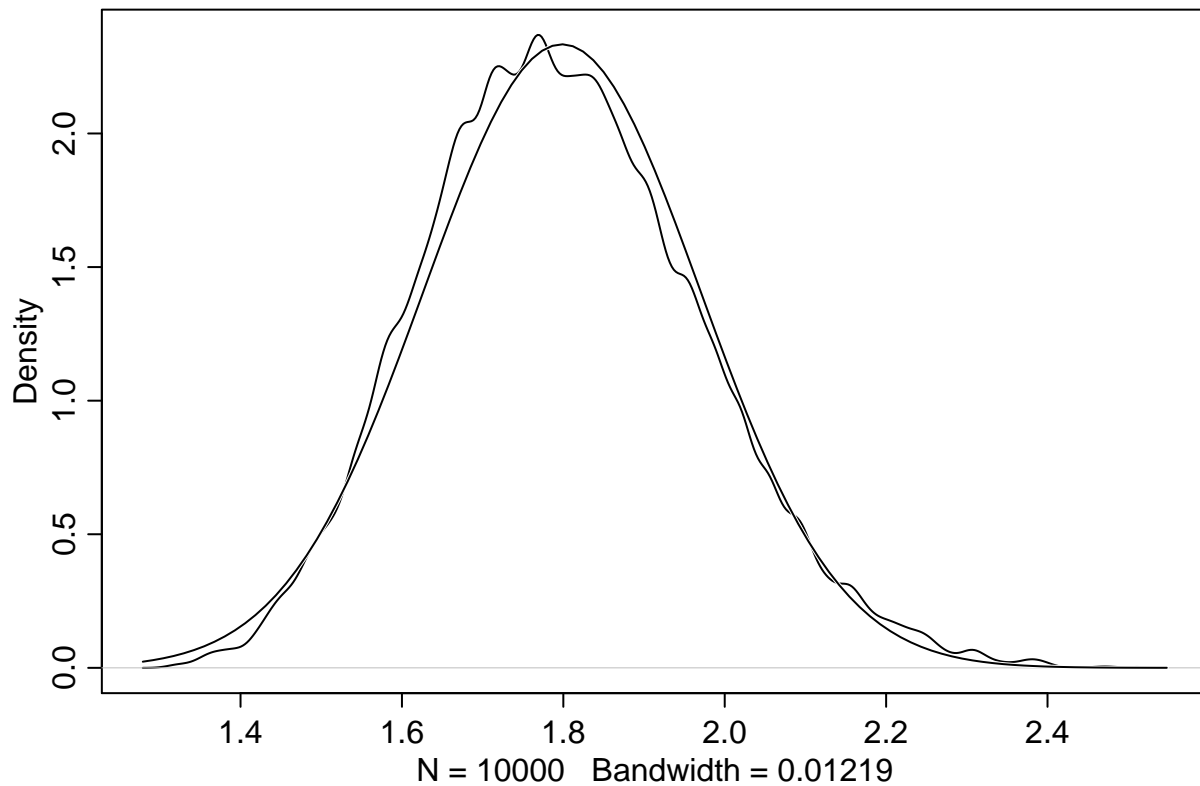# 4 - Linear Models

4.1.1. Normal by addition

```
# 4.1
pos <- replicate(1000, sum(runif(16, -1, 1)))
par(mfrow=c(1, 2))
dens(pos, norm.comp = T)
dens(replicate(10000, sum(runif(256, -1, 1))), norm.comp = T)
```
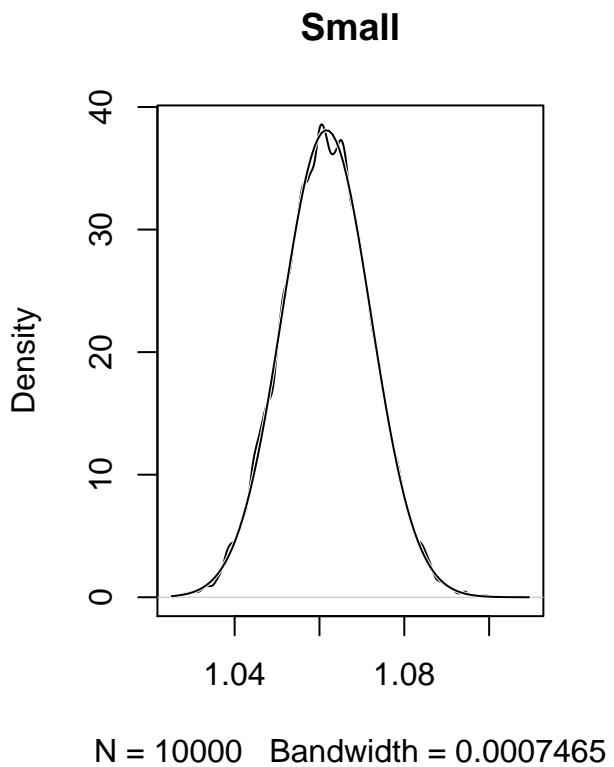

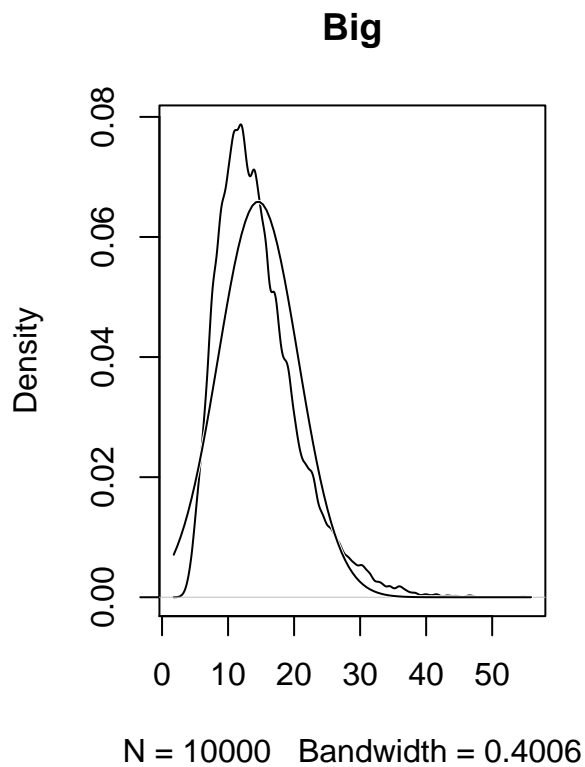### 4.1.2. Normal by multiplication

```
# 4.2
dens(replicate(1e4, prod(1 + runif(12, 0, 0.1))), norm.comp = T)
```

N = 10000   Bandwidth = 0.01219

```
# 4.4
big <- replicate(1e4, prod(1 + runif(12, 0, 0.5)))
small <- replicate(1e4, prod(1 + runif(12, 0, 0.01)))
par(mfrow=c(1, 2))
dens(big, norm.comp = T, main = "Big")
dens(small, norm.comp = T, main = "Small")
```

Big	Small

N = 10000   Bandwidth = 0.4006   N = 10000   Bandwidth = 0.0007465

Normal by log-multiplication

```r
# 4.5
big <- replicate(1e4, prod(1 + runif(12, 0, 1)))
log_big <- log(big)
par(mfrow=c(1, 2))
dens(big, norm.comp = T, main = "Big")
dens(log_big, norm.comp = T, main = "log(Big)")
```

Big

Density

0.000 0.002 0.004 0.006

0   200   600   1000

N = 10000   Bandwidth = 5.433

log(Big)

Density

0.0 0.1 0.2 0.3 0.4 0.5 0.6

2   3   4   5   6   7

N = 10000   Bandwidth = 0.04924