Math 159, Spring 2005
Professor Hardin
HW #11
due Tuesday 5/03/05

Chapter 18: 24, 30, 32, 35, 76, 77 (use BCa) + a few more

- Basic bootstrapping with an additional iteration to get the appropriate t-multiplier

```
obs.stat<-median(heroin[,4]) # 367.5
obs.stat2<-mean(heroin[,4],trim=.25) # 378.3

heroin.rs<-sample(heroin[,4],238,replace=T)

test.stat<-c()
test.stat2<-c()
sd.test.stat<-c()
sd.test.stat2<-c()


for (i in 1:1000){

heroin.rs<-sample(heroin[,4],238,replace=T)

test.stat<-c(test.stat,median(heroin.rs))
test.stat2<-c(test.stat2,mean(heroin.rs,trim=.25))


test.stat.rs<-c()
test.stat2.rs<-c()

for (j in 1:1000){
heroin.rsrs<-sample(heroin.rs,238,replace=T)
test.stat.rs<-c(test.stat.rs,median(heroin.rsrs))
test.stat2.rs<-c(test.stat2.rs,mean(heroin.rsrs,trim=.25))
}
sd.test.stat<-c(sd.test.stat,sd(test.stat.rs))
sd.test.stat2<-c(sd.test.stat2,sd(test.stat2.rs))


}
```

- 95% percentile interval

```
c(sort(test.stat)[25],sort(test.stat)[975])
c(sort(test.stat2)[25],sort(test.stat2)[975])
```

- 95% t interval

```
c(obs.stat-qt(.975,237)*sd(test.stat),obs.stat+qt(.975,237)*sd(test.stat))
c(obs.stat2-qt(.975,237)*sd(test.stat2),obs.stat2+qt(.975,237)*sd(test.stat2))
```

- 95% Bootstrap-t interval

```
t.hat<-(test.stat - obs.stat)/sd.test.stat
t.hat2<-(test.stat2 - obs.stat2)/sd.test.stat2

c(obs.stat-sort(t.hat)[975]*sd(test.stat),obs.stat-sort(t.hat)[25]*sd(test.stat))
c(obs.stat2-sort(t.hat2)[975]*sd(test.stat2),obs.stat2-sort(t.hat2)[25]*sd(test.stat2))
```

- 95% BCa interval

```
zo.hat<-qnorm(sum(test.stat<obs.stat)/1000,0,1)
a.hat<-sum((test.stat-mean(test.stat))^3)/(6*(sum((test.stat-mean(test.stat))^2)^1.5))

zo.hat2<-qnorm(sum(test.stat2<obs.stat2)/1000,0,1)
a.hat2<-sum((test.stat2-mean(test.stat2))^3)/(6*(sum((test.stat2-mean(test.stat2))^2)^1.5))


alpha1.bca<-pnorm(zo.hat + (zo.hat + qnorm(.975))/(1 - a.hat*(zo.hat + qnorm(.975))))
alpha2.bca<-pnorm(zo.hat + (zo.hat + qnorm(.025))/(1 - a.hat*(zo.hat + qnorm(.025))))


alpha1.bca2<-pnorm(zo.hat2 + (zo.hat2 + qnorm(.975))/(1 - a.hat2*(zo.hat2 + qnorm(.975))))
alpha2.bca2<-pnorm(zo.hat2 + (zo.hat2 + qnorm(.025))/(1 - a.hat2*(zo.hat2 + qnorm(.025))))


c(sort(test.stat)[ceiling(1000*alpha2.bca)],sort(test.stat)[ceiling(1000*alpha1.bca)])
c(sort(test.stat2)[ceiling(1000*alpha2.bca2)],sort(test.stat2)[ceiling(1000*alpha1.bca2)])
```

	Median			25% Trimmed Mean		
	lower	observed	upper	lower	observed	upper
Percentile	321.00	367.50	452.00	339.38	378.30	423.46
t	306.33	367.50	428.67	335.21	378.30	421.39
BS-t	294.98	367.50	418.00	334.28	378.30	418.09
BCa	317.00	367.50	444.50	338.29	378.30	422.43