lecture 4.8 example 6

preliminaries

```
#clear workspace
rm(list=ls())
#initalize random seed
set.seed(123)
```

set simulation parameters

```
beta0 = 0
beta1 = 1
beta2 = 0.5
sigma = 1
nObs = 250

alpha = seq(0, 0.9, by = 0.05)
nSims = 1000
```

carry out simulations

```
betaX1 = array(rep(0,length(alpha) * nSims),
               dim = c(length(alpha), nSims))
betaX2 = array(rep(0,length(alpha) * nSims),
               dim = c(length(alpha), nSims))

for (t in 1:length(alpha)) {
  for (s in 1:nSims) {
    z = runif(nObs,-1,1)
    x1 = alpha[t] * z + (1-alpha[t]) * runif(nObs,-1,1)
    x2 = alpha[t] * z + (1-alpha[t]) * runif(nObs,-1,1)
    y = beta0 + beta1 * x1 + beta2 * x2 + rnorm(nObs,mean=0, sd=sigma)
    m = lm(y ~ x1 + x2 )
    betaX1[t,s] = coef(m)[2]
    betaX2[t,s] = coef(m)[3]
  }
}
```

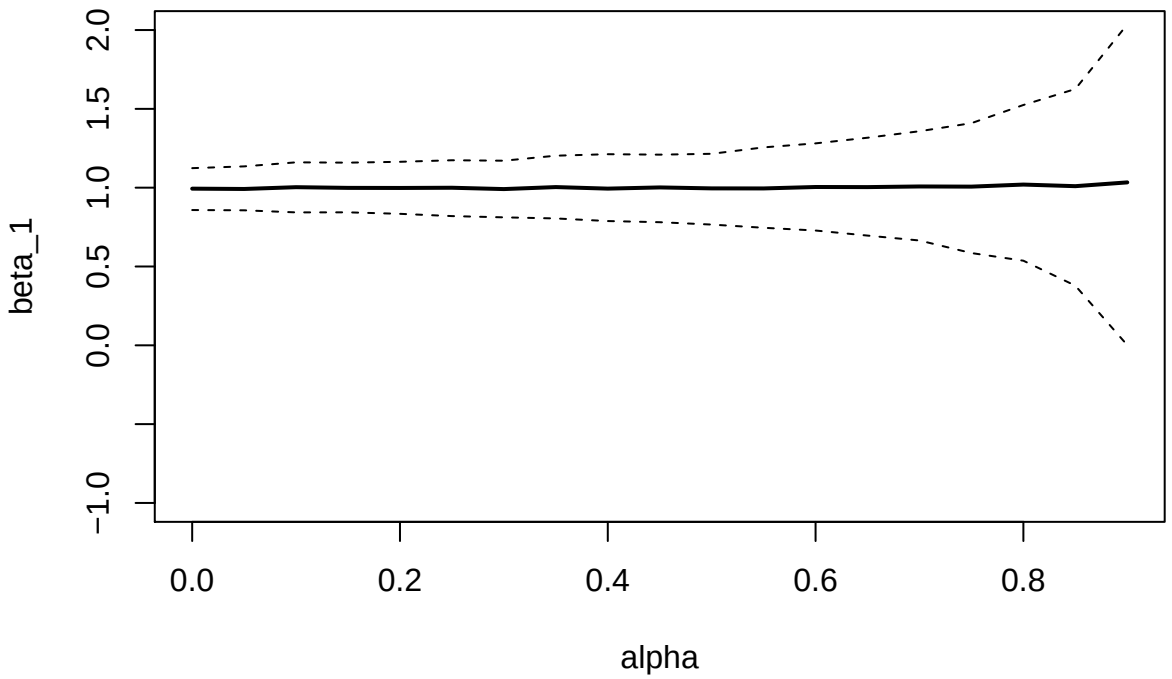
visualize results

```
betaX1_Mean = apply(betaX1,c(1),mean)
betaX1_10 = rep(0, length(alpha))
for (t in 1:length(alpha)) {
  betaX1_10[t] = quantile(betaX1[t,],probs=0.1)
}
betaX1_90 = rep(0, length(alpha))
```

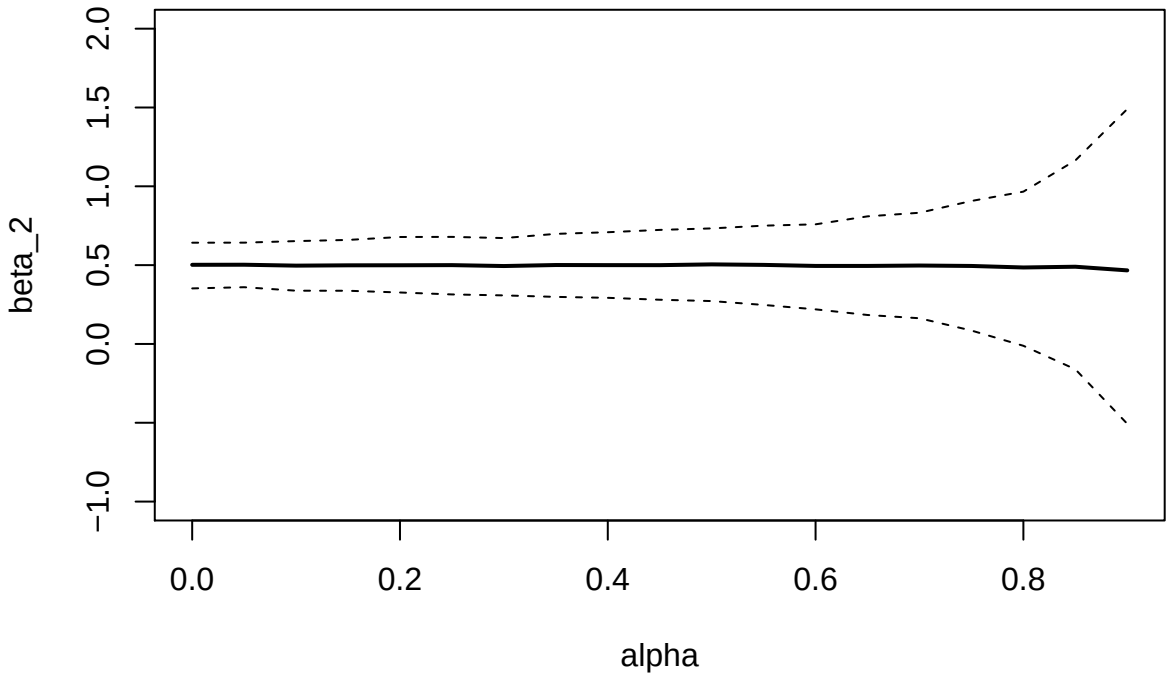
```
for (t in 1:length(alpha)) {
  betaX1_90[t] = quantile(betaX1[t,],probs=0.9)
}

betaX2_Mean = apply(betaX2,c(1),mean)
betaX2_10 = rep(0, length(alpha))
for (t in 1:length(alpha)) {
  betaX2_10[t] = quantile(betaX2[t,],probs=0.1)
}
betaX2_90 = rep(0, length(alpha))
for (t in 1:length(alpha)) {
  betaX2_90[t] = quantile(betaX2[t,],probs=0.9)
}

plot(alpha, betaX1_10, type="l", lty=2,
     ylim=c(-1,2), xlab = "alpha",
     ylab = "beta_1")
points(alpha, betaX1_90, type="l", lty=2)
points(alpha, betaX1_Mean, type="l", lwd =2)
```




```
plot(alpha, betaX2_10, type="l", lty=2,
     ylim=c(-1,2), xlab = "alpha",
     ylab = "beta_2")
points(alpha, betaX2_90, type="l", lty=2)
points(alpha, betaX2_Mean, type="l", lwd =2)
```


beta_2
2.0
1.5
1.0
0.5
0.0
−1.0
0.0
0.2
0.4
0.6
0.8
alpha