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## 5.R.R1

1/1 point (graded)

Download the file 5.R.RData and load it into R using load("5.R.RData"). Consider the linear regression model of y on X1 and X2. What is the standard error for  $\beta_1$ ?

0.02593

**✓ Answer:** 0.02593

0.02593

### **Explanation**

Use summary(lm(y~.,data=Xy))

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**1** Answers are displayed within the problem

# 5.R.R2

0/1 point (graded)

Next, plot the data using matplot(Xy,type="l"). Which of the following do you think is most likely given what you see?

Our estimate of  $s.e.(\hat{\beta}_1)$  is too high.

 $\bigcirc$  Our estimate of  $s.\,e.\,(\hat{eta}_1)$  is too low. ullet

lacktriangle Our estimate of  $m{s.e.}\left(\hat{m{eta}}_{1}
ight)$  is about right.  $m{ imes}$ 

# **Explanation**

There is very strong autocorrelation between consecutive rows of the data matrix. Roughly speaking, we have about 10-20 repeats of every data point, so the sample size is in effect much smaller than the number of rows (1000 in this case).

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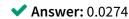
Answers are displayed within the problem

### 5.R.R3

1/1 point (graded)

Now, use the (standard) bootstrap to estimate  $s.e.(\hat{\beta}_1)$ . To within 10%, what do you get?

0.02593295



0.02593295

### **Explanation**

When we do the i.i.d. bootstrap, we are relying on the original sampling having been i.i.d. That is the same assumption that screwed us up when we used lm.

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### 5.R.R4

0/1 point (graded)

Finally, use the block bootstrap to estimate  $s.e.(\hat{\beta}_1)$ . Use blocks of 100 contiguous observations, and resample ten whole blocks with replacement then paste them together to construct each bootstrap time series. For example, one of your bootstrap resamples could be:

new.rows = c(101:200, 401:500, 101:200, 901:1000, 301:400, 1:100, 1:100, 801:900, 201:300, 701:800)

new.Xy = Xy[new.rows, ]

To within 10%, what do you get?

**X** Answer: 0.2 0.02593295 0.02593295**Explanation** The block bootstrap does a better job of mimicking the original sampling procedure, because it preserves the autocorrelation.

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