Quiz 3 (Last part of Ch 6)

Started: Sep 19 at 5:28pm

Quiz Instructions

This quiz involves a simulated data set with 100 observations and five variables Y, X1, X2, X3, and X4. Two regressions are fitted, as follows. Please answer the four T/F questions about these two models.

```
> ############  FIRST MODEL #############


> lm.1 <- lm(Y ~ X1 + X2 + X3 + X4)
> summary(lm.1)

Call:
lm(formula = Y ~ X1 + X2 + X3 + X4)

Residuals:
    Min      1Q  Median      3Q     Max
-2.4832 -0.5715  0.1805  0.5873  1.8539

Coefficients:
             Estimate   Std. Error  t value     Pr(>|t|)
(Intercept) -0.06645    0.09750  -0.682  0.49716
X1           0.67716    0.41660   1.625  0.10738
X2           1.29547    0.39981   3.240  0.00165 **
X3           1.22836    0.39169   3.136  0.00228 **
X4           0.74947    0.38613   1.941  0.05523 .
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.9564 on 95 degrees of freedom
Multiple R-squared:  0.9015,    Adjusted R-squared:  0.8973
F-statistic: 217.3 on 4 and 95 DF,  p-value: < 2.2e-16


############ SECOND MODEL ##################
```

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```
Call:
lm(formula = Y ~ X1 + X3 + X4)

Residuals:
     Min       1Q   Median       3Q      Max
-2.7781 -0.6107  0.1096  0.7207  2.0080

Coefficients:
             Estimate   Std. Error  t value     Pr(>|t|)
(Intercept) -0.01747    0.10097  -0.173  0.86301
X1           1.99315    0.09727  20.491  < 2e-16 ***
X3           1.13759    0.40956   2.778  0.00659 **
X4           0.82137    0.40412   2.033  0.04486 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 1.003 on 96 degrees of freedom
Multiple R-squared:  0.8906,    Adjusted R-squared:  0.8871
F-statistic: 260.4 on 3 and 96 DF,  p-value: < 2.2e-16
```

Question 1

1 pts

In the first model, `lm.1`, we find that the VIF for X2 is 20.18 and the VIF for X4 is 16.06.

True or False: This means that X2 and X4 are collinear.

- ◯ True
- ◯ False

Question 2

1 pts

True or False: There might be no linear relationship between X1 and X3, even though the VIF for X2 is 20.18 and the VIF for X4 is 16.06.

- ◯ True
- ◯ False

Question 3

1 pts

Note that in `lm.1`, *only two predictors* have coefficients significantly different from zero: X2 and X3. The coefficient for X4 is just at the borderline of significance, and the coefficient for X1 is not significantly different from zero at all.

On the other hand, in the model `lm.2`, *all three predictors* X1, X3 and X4 have coefficients significantly different from zero.

True or False: Since all the predictors in `lm.2` are significant, and only two of the four predictors in `lm.1` are significant, `lm.2` is a better model than `lm.1`.

- ◯ True
- ◯ False

Question 4

1 pts

Comparing models `lm.1` and `lm.2`...

True or False: X2 and X1 appear to be collinear.

- ◯ True

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