



## Chapter 7 Quiz

### 7.Q.1

1/1 point (graded)

Suppose we want to fit a generalized additive model (with a continuous response) for  $y$  against  $X_1$  and  $X_2$ . Suppose that we are using a cubic spline with four knots for each variable (so our model can be expressed as a linear regression after the right basis expansion).

Suppose that we fit our model by the following three steps:

1) First fit our cubic spline model for  $y$  against  $X_1$ , obtaining the fit  $\hat{f}_1(x)$  and residuals  $r_i = y_i - \hat{f}_1(X_{i,1})$ .

2) Then, fit a cubic spline model for  $r$  against  $X_2$  to obtain  $\hat{f}_2(x)$ .

3) Finally construct fitted values  $\hat{y}_i = \hat{f}_1(X_{i,1}) + \hat{f}_2(X_{i,2})$ .

Will we get the same fitted values as we would if we fit the additive model for  $y$  against  $X_1$  and  $X_2$  jointly?

☐ yes, no matter what

☐ only if  $X_1$  and  $X_2$  are uncorrelated

☒ not necessarily, even if  $X_1$  and  $X_2$  are uncorrelated.



#### Explanation

If  $X_1$  and  $X_2$  are uncorrelated, and we are only fitting a linear regression (only linear terms for  $X_1$   $X_2$ ) then this method would work. However, even if  $X_1$  and  $X_2$  are uncorrelated, the nonlinear basis functions might be.

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**i** Answers are displayed within the problem

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