Bases Quiz

4/4 points (100%)

Quiz, 4 questions

✔ Congratulations! You passed!

Next Item

✔ 1 / 1 points

1.
If $X = [X_1\ X_2\ \ldots\ X_p]$ so that $X'X = I$, then the fitted values for response vector Y are (check all that apply)?

☐ $XX'Y$

Correct
$X'X = I$.

☐ $X(X'X)^{-1}X'Y$

Correct
This is always true when X is full rank.

☐ $\sum_{i=1}^{p} X_i < X_i, Y >$

Correct
Work out the relevant block matrix calculations for $X'Y$.

✔ 1 / 1 points

2.

Bases Quiz

Quiz, 4 questions

Take the mtcars dataset. Use dplyr to select the variables mpg, hp, drat, wt and qsec. Preform principal components on the correlation matrix (not the covariance matrix). Around what percentage of the total variation does the first principal component explain?

4/4 points (100%)

- 35%
- 50%
- 65%

Correct

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1 / 1 points

3.
If a matrix, X, is $n \times p$ of rank p then the SVD of $X = UDV'$ will be such that $V' = V^{-1}$.

- True

Correct
$V'V = I$ and V is $p \times p$ of full rank, so that V^{-1} exists.
$V^{-1}V = I = V'V$, multiplying both on the RHS by V^{-1} yields the result.

- False

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1 / 1 points

4.
If $X = [X_1\ X_2\ \ldots\ X_p]$ so that $X'X = I$. Let $X_S = [X_{i_1}\ X_{i_2}\ \ldots X_{i_k}]$ be a matrix comprised of a subset of the columns of X. Consider a response vector, Y. Will the coefficients for the columns using X_S as the design matrix be the same as those for the corresponding columns of X?

- False, they won't necessarily be the same
- True, they will be the same

Bases Quiz

Quiz, 4 questions

Correct

The coefficients are $< X_{i_j}, Y >$ for column X_{i_j} regardless of whether the full model includes any subset of the the other columns because of the orthonormality.

4/4 points (100%)