STAT 509 2017 Summer HW17

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Lecture Day: June 13

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1. Matrix A and vector B is defined respectively by

$$A = \begin{pmatrix} 3 & 7 \\ 12 & -2 \end{pmatrix}, B = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$$

   (a) Calculate AB

   (b) Calculate A^T

   (c) Calculate $A^T B$

   (d) Calculate $B^T A^T$

2. In `gala` dataset, suppose we want to form a multiple linear regression model using Species as response, and all others as predictors (independent variables). Represent the model using matrix notation $\mathbf{Y}$, $\mathbf{X}$, β, and ϵ, and mark the dimension for each vector and matrix. *(Hint: Slides page 10)*

3. There are two matrices A and B, defined by

$$A = \begin{pmatrix} 2 & 1 \\ 4 & -2 \end{pmatrix}, B = \begin{pmatrix} 0.25 & 0.125 \\ 0.5 & -0.25 \end{pmatrix}$$

   (a) Calculate AB

   (b) Calculate BA

   (c) Do you find that the two results in (a) and (b) are the same? The result is called identity matrix. For any matrix M, the inverse matrix of M can be wrote as M^{-1}, and by definition of inverse matrix, $MM^{-1} = M^{-1}M = I$, where I is the identity matrix. Using the previous results to find A^{-1} and B^{-1}.