

1. Problem 5 of Chapter 10. (p.136)
2. Problem 8 of Chapter 10 (p.137) (Hint for (b): Full column rank implies the existence of left inverse. Try to find the relation between the left inverse and the g-inverse. Do the same for a full row rank matrix.)
3. Let \mathbf{A} be an $n \times n$ matrix and \mathbf{x} be a $n \times 1$ vector. Show that
 - (i) If $\mathbf{Ax} = 0$ for all \mathbf{x} , then $\mathbf{A} = \mathbf{0}$.
 - (ii) If \mathbf{A} is symmetric and $\mathbf{x}'\mathbf{Ax} = 0$ for all \mathbf{x} , then $\mathbf{A} = \mathbf{0}$.
 - (iii) If \mathbf{A} may not be symmetric, then $\mathbf{x}'\mathbf{Ax} = 0$ for all \mathbf{x} implies $\mathbf{A} = -\mathbf{A}'$.
4. We have shown in class that the projection matrix $\mathbf{X}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'$ is symmetric and idempotent. Show that any $\mathbf{A}_{n \times n}$ is a projection matrix if and only if it is symmetric and idempotent.

SAS Problems (Please hand in your sas program and list file.)

The dataset is stored at: <http://www.stat.ufl.edu/~yang/STA6329/datasets.htm>

This is supposed to be the dataset you get from your client. You need to read the descriptions, but should not modify them in any way.

5. Refer to the USED CARS dataset. Write a SAS program which reads the dataset and prints only the following information in this order:

Year, Manufacturer, Model

Mileage (printed as "< 50,000", ">= 50,000", or "Unknown", depending on the numeric value of the mileage variable)

Cost (printed as "Economy" if the price is under \$5,000, "Moderate" if the price is between \$5,000 and \$10,000, or "Expensive" if the price is over \$10,000)

Use FORMAT statements to print the mileage and cost variables. Write at least one comment statement in your program.

6. Refer to the USED CARS dataset. Write a SAS program which reads the full dataset. Then, create a dataset which contains only the least expensive car offered by each dealer. Print the new dataset, showing the year, manufacturer, model, price, and name of the dealer. This output dataset should have 15 observations, and each dealer should appear exactly once. (Hint: Use the first.x SAS automatic variable.)