

18.06 Spring 2013 – Problem Set 6

This problem set is due Thursday, April 4th, 2013 at 4pm (hand in to Room 2-255). The textbook problems are out of the 4th edition. A correct answer will only earn you half of the available points. The other half of the points come from your explanation.

Note: Your recitation instructor is responsible for allowing late homework submissions, as well as the re-grading of your PSet. If there is any problem with your PSet, contact your recitation instructor!

1. (8 pts) Do Problem 4 & Problem 9 from Section 5.2.
2. (8 pts) Do Problem 12 & Problem 15 from Section 5.2.
3. (8 pts) Do Problem 23 & Problem 34 from Section 5.2.
4. (8 pts) Do Problem 1 & Problem 12 from Section 5.3.
5. (8 pts) Do Problem 20 from Section 5.3.
6. (8 pts) Do Problem 36 from Section 5.3.
7. (8 pts) Do Problem 9 & Problem 17 from Section 6.1.
8. (8 pts) Do Problem 19 from Section 6.1.
9. (8 pts) Do Problem 30 from Section 6.1
10. (28 pts)
 - (a) Choose the number x to maximize the determinant (this means maximizing the entropy!) of the symmetric matrix

$$S = \begin{bmatrix} 4 & 2 & x \\ 2 & 4 & 2 \\ x & 2 & 4 \end{bmatrix}.$$

- (b) For the value in part (a), find the inverse of S .
- (c) The $(1, 3)$ -entry of S^{-1} is determined by a submatrix of S . Which submatrix is it?
- (d) This part shows another approach in maximizing $\det S$. From the last Pset, we know that

$$4 \det S = (\det A)(\det D) - (\det B)^2,$$

where A, B, D, C (with $B = C$) are the 2×2 corner matrices in S , labeled clockwise starting with $A = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$. From this formula, what should $\det B$ be, if you want to maximize $\det S$?