STAT/BIOSTAT 534 Statistical Computing
Spring Quarter 2017
Homework 6

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This homework is due on Friday, May 19 at 11:00pm. You should use the dropbox to submit your code. Please note that you will be graded not only on how your code works, but also on how readable your code is.

Problem 1 (50 points)

You need to write a recursive function that calculates the determinant of an $n \times n$ matrix $A = (a_{ij})$. The algorithm should proceed as follows.

- If $n = 1$, then $\det(A) = a_{11}$.

- If $n = 2$, then $\det(A) = a_{11}a_{22} - a_{12}a_{21}$.

- If $n \geq 3$, the determinant of A is a function of the determinants of n matrices of dimension $(n-1) \times (n-1)$:

$$\det(A) = \sum_{j=1}^{n} a_{ij}(-1)^{i+j}\det(A_{-(i)(j)}).$$

This decomposition holds for any $i \in \{1, \ldots, n\}$. Here $A_{-(i)(j)}$ denotes the submatrix formed from A by removing the i-th row and the j-th column.

Your "main.cpp" program should calculate/output the value of the determinant of the matrix saved in the file "mybandedmatrix.txt".

Problem 2 (25 points)

Transform the function `AddRegression` I shared with you in the function:

```
void AddRegression(int nMaxRegs,LPRegression regressions,
                   int lenA,int* A,double logmarglikA)
```

This function retains only "nMaxReg" regressions having the largest marginal likelihood. This means that, after a new regression is added, the regressions with the smallest marginal likelihood are deleted from the linked list. Please share your code with me and provide the output in your write-up.

Problem 3 (25 points)

Use the function "AddRegression" from Problem 2 to find the best 10 regressions with at most two predictors. The best regressions have the largest marginal likelihood.