Table of Contents

AMSC 460 - HW6

```
clear all; format compact; close all; syms f(x) x y
```

```
Error using dbstatus
Error: File: C:\Users\josep\OneDrive\Documents\GitHub\Matlab_store
\Courses\Amsc460\HW\HW6\HW6.m Line: 31 Column: 9
Incorrect use of '=' operator. To assign a value to a variable, use
 '='. To compare values for equality, use '=='.
```

Problem 1

Obtain the precise operation count (number of operations $+, -, *, /$) for computing a matrix-matrix product AB. Suppose each matrix is $n \times n$.

(AB)ij = #aibkj (1<=i<=n&1<=j<=n). For matrix B the ith component will have n multiplications, and n -1 additions . The total amout will be 2n-1 for each i.

The total count for bij in matrix B * A is n(2n-1) = 2n^3-n Since B is n*n matrix , so the total operation wil be n*n(2n-1)= 2n^3-n^2

O(n^3)

Problem 2

Suppose we have an n × n matrix. In class we discussed how the elimination step of Gaussian elimination (LU) is O(n^3), while back-substitution (or forward- substitution) is only O(n^2). The back-substitution steps for finding the components xi of a solution can be concisely written as xn = bn/unn,xi =1/uii(bi ##uijxj) , for i = n _ 1, ..., 1.

Show that the total operation count (number of operations +, _, *, /) for constructing x is exactly n^2.

```
for j = n to 1
  if uij=0 stop
  xj = bj/uij
     for i = 1 to j-1
         bi = bi-uijxj
     end
end
```

Since it is a n*n matrix, for every i, the operation will be consisted of 1 divion 1 subtraction and (n-(i +1))+1 = n-i multiplications and n-i-1 adddditions

Adding up all operations and sum it from i =1 to n we can have (2n-1=1)/2 = n^2 So the total operation count is n^2

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