Computing $A^{-1}B$

Let $A$ be an $n$ by $n$ matrix, and $x$ and $B$ be both $n$ by $m$ matrices. Supposed matrices $A$ and $B$ are given, and we want to solve the linear system of equations

$$AX = B$$

for $X$. In component form this equation is

$$\sum_{j=1}^{n} A_{ij} X_{jk} = B_{ik}.$$
Therefore the problem is basically the same as the linear system

$$Ax = b$$

where $x$ and $b$ are $n$-vectors, except that we now have $m$ copies of the problem, each having the same $A$ but having vectors $x$ and $b$ taken from each of the corresponding columns of $X$ and $B$ respectively. Therefore LU factorization using Gaussian elimination can be used efficiently to find matrix $X$ without first explicitly finding $A^{-1}$ and then multiply by $B$ (a very inefficient process). We only need to perform LU
factorization of $A$ once, then forward and backward substitution can then be done for each columns of $B$ to obtain the corresponding column of $X$. 
Centered Difference Formula for first derivative
Trade-off between Truncation & Roundoff Errors

Total Computational Error
Step Size, h
Truncation dominated
Roundoff dominated

Roundoff dominated
Truncation dominated