Practice on line search algorithm based on steepest descent and Newton
This worksheet will also be part of your project 1

Name : _____

1. Test the code **linesearch-steepestdescent** and **linesearch-newton** in mycourses with the following functions:
   1. $f(x, y) = x^2 + y^2$. Are both codes able to handle this function easily? Explain.
   2. $f(x, y) = -exp(-5(x^2 + y^2))$.
   3. $(x, y) = 2x + x^2 - 2y^2$.

2. How do you modify the code **linesearch-steepestdescent** and **linesearch-newton** in order to find maximum values instead of minimum values ? Test your modified code to find the maximum of the function $f(x, y) = exp(-5(x^2 + y^2))$.

3. Create a hybrid code where steepest descent is used at a point where the Hessian is not positive definite and Newton is used at a point where Hessian is positive definite. Test your code with the Rosenbrock function.

4. Modify the code **linesearch-steepestdescent** so that adaptive step-length α_k is used instead of the fixed one. Design your own criteria regarding how to choose α_k at every step.