

ME598/494 Homework 5

1. (100 points) Consider the following problem.

$$\begin{aligned}\min f &= x_1^2 + (x_2 - 3)^2 \\ \text{s.t. } g_1 &= x_2^2 - 2x_1 \leq 0 \\ g_2 &= (x_2 - 1)^2 + 5x_1 - 15 \leq 0\end{aligned}$$

Write a MATLAB code to apply an SQP algorithm with line search, starting from $\mathbf{x}_0 = (1, 1)^T$. Solve the QP subproblem using (6.79) and BFGS approximation (6.33), (6.73), (6.74) for the Hessian of the Lagrangian. Use the merit function (6.76) and Armijo Line Search to find the step size.

Note: For MAE598, write your own script to solve the QP subproblem with an active-set strategy. For MAE494, use the built-in MATLAB function *quadprog* to solve the QP subproblem.