1. Exercise 8.11
   1. We can see that for , the expression can be rewritten as

, which is the minimization. We can also rewrite as . Since and we have the matrix multiplied by our vector . We see that , therefore our product depends solely on and , which gives us **.** Therefore, we have the equivalent constraint. Hence, we have a standard QP-problem.

* 1. and , therefore

. This is a symmetric matrix, and we then get , which means the matrix is positive semi-definite.

1. Let us have the following data set: . . This gives us

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1. is the system. Subtracting (i) from (ii) and adding (i) to (iii) gives us for our system. Plotting the data points gives us a linear separator at the line .
2. The dual problem expands into: . Substituting our dataset yields which simplifies to subject to the constraint and . To minimize this function under our constraints, we use Lagrange multipliers. . We can eliminate by making the substitution , resulting in We then get the following derivatives: . Solving these for gives us