Definitions

Let:
A: be a positive definite matrix
n: size of the square matrix A
i, j: be the rows and columns index respectively
x: be a column vector of size n

Exercice 28.3-1

Let:
x^k: be the column vector where all values are zero except index k
Then
$x^{k^T} A x^k = a_{kk} > 0$ by definition of A

Exercice 28.1-3

Lets assume that the maximum isnt on the diagonal.
Let: i_0, j_0 be the indexes of the maximum cell where $i_0 \neq j_0$
Additionally,
$x^0 \in \Re^{nx1} / x_i^0 = 0 \; if \; i \neq i_0, j_0 \; and \; x_{i_0}^0 = 1 \; and \; x_{j_0}^0 =- 1$
It follows that:
$(x^0)^T A x^0 = a_{i_0 i_0} + a_{j_0 j_0} - (a_{i_0 j_0} + a_{j_0 i_0}) = a_{i_0 i_0} + a_{j_0 j_0} - 2a_{i_0 j_0}$
Since $a_{i_0 j_0}$ is the max cell then $a_{i_0 i_0} + a_{j_0 j_0} - 2a_{i_0 j_0} \leq 0$
This contradicts the definition $(x^0)^T A x^0 > 0$
Hence the maximum lays on the diagonal