(5)

$$\mathrm{Re}(\{x, x\}) = \frac{1}{2}\mathrm{Re}\left(\sum_i\sum_j x_i m_{ij} \bar{x}_j + \sum_i\sum_j \bar{x}_i \bar{m}_{ij} x_j\right) \quad [\text{Put } i \leftrightarrow j]$$

$$= \frac{1}{2}\mathrm{Re}\left(\sum_i\sum_j x_i m_{ij} \bar{x}_j + \sum_i\sum_j x_i m_{ji} \bar{x}_j\right)$$

$$= \frac{1}{2}\mathrm{Re}\left(\sum_i\sum_j x_i (m_{ij} + m_{ji}) \bar{x}_j\right)$$

$$= \frac{1}{2}\sum_i\sum_j x_i (m_{ij} + m_{ji}) \bar{x}_j \quad \text{by symmetry.}$$

and we require this to be be greater than or equal to zero. If x is nlth the zero vector then we require it to be greater than zero, so M must be +ve definite

what do you mean by M +ve definite? (It's a tautology to give the standard def. $xMx^T \geq 0$ and $=0$ for $x=0$ $\forall x$). By using prof. that hermit. M may be diagonalized $UMU^* = \mathrm{diag}(\lambda_1, \lambda_2, \ldots, \lambda_n)$ we can easily show that this property is equivalent to all $\lambda_i > 0$.