

1. Given the QF : $8x^2+6xy$
 - (a) find the symmetric matrix of QF.(20pt)
 - (b) classify the QF as positive definite, negative definite or indefinite.(20pt)

(a) $\begin{bmatrix} 8 & 3 \\ 3 & 0 \end{bmatrix}$

(b) indefinite
2. QF : $Q(x) = 9x^2+4y^2+3z^2$, with the constraint $x^2+y^2+z^2=1$
 - (a) find the maximum value of $Q(x)$.(20pt)
 - (b) find the minimum value of $Q(x)$.(20pt)

(a) 9

(b) 3
3. Is a positive matrix always invertible? True or false? Briefly explain your reason.(20pt)

True, since $\det(A) = \lambda_1 \cdots \lambda_n$, all λ_i s are positive