Quiz 8

NOVEMBER 1, 2018

Name (Last, First)

1. (5pts) Let $Q(x, y, z) = 2x^2 + 5y^2 + 2z^2 + 6xy + 6yz$. Determine if $Q(x, y, z)$ is positive definite or negative definite or indefinite.

2. (5pts) Let A be a 3×3 matrix with the following singular value decomposition.

$$A = \begin{bmatrix} 1 & 1 & -1 \\ 1 & -1 & 1 \\ 1 & -1 & -1 \end{bmatrix} = \begin{bmatrix} 0 & 2/\sqrt{6} & 1/\sqrt{3} \\ 1/\sqrt{2} & -1/\sqrt{6} & 1/\sqrt{3} \\ 1/\sqrt{2} & 1/\sqrt{6} & -1/\sqrt{3} \end{bmatrix} \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} & 0 \\ 1/\sqrt{6} & 1/\sqrt{6} & -2/\sqrt{6} \\ 1/\sqrt{3} & 1/\sqrt{3} & 1/\sqrt{3} \end{bmatrix} = U\Sigma V^T$$

a. Find a singular value decomposition of A^T.

b. Find a singular value decomposition of A^{-1}.