Marks

[8]   **1.**   Consider a zero sum game with M being player A's payout matrix.

(a) Show that for any matrix M and probability vectors $\vec{\alpha}, \vec{\beta}$ (of appropriate dimension) we have
$$\text{Scream}_A(\vec{\alpha}) \leq \vec{\alpha}^{\text{T}} M \vec{\beta} \leq \text{Scream}_B(\vec{\beta}) \tag{1}.$$

(b) Assume equation (1) always holds. Show that if
$$\text{Scream}_A(\vec{\alpha}) = \text{Scream}_B(\vec{\beta}) \qquad \text{and} \qquad \text{Scream}_A(\vec{\alpha}') = \text{Scream}_B(\vec{\beta}')$$

then
$$\text{Scream}_A(\vec{\alpha}) = \text{Scream}_A(\vec{\alpha}')$$