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MATH221 06 extra problems   Name, ID

1. If x, y are $n \times 1$ column vectors having all real elements and two conditions

      1) $x \neq 0$ and $y \neq 0$

      2) $A = xy^T$ where A is a symmetric matrix

Then, show that there exists a $n \times 1$ real column vector u such that $A = uu^T$ or $A = -uu^T$.

2. If A is a 2 by 2 matrix

$$A = \frac{1}{2} \begin{pmatrix} 0 & \sqrt{2} \\ -\sqrt{2} & 0 \end{pmatrix}$$

then find a matrix

$$e^A = \sum_{n=0}^{\infty} \frac{A^n}{n!}.$$