

$$X^T A X \geq 0 \quad \forall X \in \mathbb{R}^n \quad \text{positive semi-definite}$$

$$u^T u = 1$$

$$A = I - 2uu^T \quad \text{eigenvalue of } A$$

$$A^T = I - 2u^T u$$

$$A^T A = (I - 2u^T u)(I - 2uu^T)$$

$$= I - 2uu^T - 2u^T u + 4u^T u u u^T$$

$$= I - 2(u^T u) - 2u^T u + 4(u^T u)(u^T u)$$

$$= I - \cancel{4} + 4 = I \quad \#$$

$$0 \leq \lambda$$

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