Solving Issue of Negative Entries

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- Q', K' are sketches for degree $p/2$

- All entries of $Q'' \cdot (K'')^{\mathsf{T}}$ are **non-negative**!

- One of our **technical contributions** is that if Q' and K' have AMM property for degree $p/2$, then Q'' and K'' have AMM property for degree p

- $\|Q'' \cdot (K'')^{\mathsf{T}} - Q^{\otimes p}(K^{\otimes p})^{\mathsf{T}}\|_F$ is small

- Just compute $\mathrm{LT}(Q'' \cdot (K'')^{\mathsf{T}}) \cdot V$

- The model converges!

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Our Sketch

$$Q' = (Q^{\otimes(p/2)}) \cdot S \qquad Q'' = (Q')^{\otimes 2}$$