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The log of an operator with spectrum the unit circle

Let X be a complex Banach space and T a bounded linear operator on X with spectrum equal to the unit circle, so that $T+I$ is one-one with dense range. It is proved that there exists a bounded linear operator S on X so that $e^S = T$. (A new proof is also given for the old known result that if one assumes instead that the spectrum is a proper subset of the unit circle,then such an S exists).