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J E Pascoe* (pascoej@math.wustl.edu). *Monotonicity in free analysis.*

Let $f : (a, b) \rightarrow \mathbb{R}$. The function f is said to be *matrix monotone* if $A \leq B \Rightarrow f(A) \leq f(B)$ for all pairs of like-sized self-adjoint matrices with spectrum in (a, b) . Classically, Charles Löwner showed that a bounded Borel function is matrix monotone if and only if it is analytic and extends to be a self-map of the upper half plane. The theory of matrix monotonicity has profound consequences for any general theory of matrix inequalities. For example, it might seem surprising that $X \leq Y$ does not imply that $X^2 \leq Y^2$, which is a consequence of Löwner's theorem. We will discuss commutative and noncommutative generalizations to several variables of Löwner's theorem. (Received September 21, 2015)