Formal Definition of Relational Algebra

A relational expresson is

a relation $R$ in the database

or

a constant relation

or for relational expressions $E_1$, $E_2$

$E_1 \cup E_2$

$E_1 - E_2$

$E_1 \times E_2$

$\sigma_P(E_1)$ where $P$ is a predicate on attribures of $E_1$

$\pi_S(E_1)$ where $S$ is a subset of attribures of $E_1$

$\rho(C(\bar{F}), E_1)$ where $C$ is a new relation name and $\bar{F}$ is a list of ($oldname \rightarrow newname$) mappings of attributes of $E_1$