RA cheatsheet - This is a relational algebra cheat sheet.

Introduction to Databases (University of Toronto)

CSC343 Relational Algebra Cheat Sheet

Operation	Symbol	Latex	Sample usage	Notes
Select	σ	\sigma	$\sigma_{s.cgpa \geq 3.5}(s)$	
Project	π	\pi	$\pi_{s.name,\ s.cgpa}(s)$	
Cartesian Product	×	\cross	$\sigma_{lab.utorid = test.utorid}(lab \times test)$	
Set Union	∪	\cup	$A \cup B$	Includes all tuples that are in tables A OR in B, remove duplicates
Set Intersection	∩	\cap	$A \cap B$	Includes all tuples that are in tables A AND in B, remove duplicates
Set Difference	-	-	$A - B$	Includes all tuples that are in table A NOT in B, remove duplicates
And	∧	\wedge	$A \wedge B$	Conjunction
Or	∨	\vee	$A \vee B$	Disjunction
Rename	ρ	\rho	$\rho_{'new\ name'/'old\ name'}(s)$	
Duplicate Elimination	δ	\delta	$\delta(R)$	Only retain unique pair of R(A, B)
Sort	τ	\tau	$\pi_{s.cgpa}(\tau_{s.cgpa}(s))$	Default sort by ascending order, extra -, $\tau_{-s.cgpa}(s)$ is sorting by descending order
Grouping and Aggregation	γ	\gamma	I := Infraction $\pi_{SIN,\ SUM(Fine)}\ (\gamma_{SIN,\ SUM(Fine)}(I))$	Aggregation operation include: AVG, MIN, MAX, SUM, COUNT
Variable Assignment (shorthand)	→	\rightarrow	I := Infraction $\pi_{SIN,\ s}\ (\gamma_{SIN,\ SUM(Fine) \rightarrow s}\ (I))$	Stores SUM(FINE) into a variable called s for this RA query.

Theta Join	$\bowtie_{\theta}$	\bowtie_\theta	$A \bowtie_{A.column\ 2 > B.column\ 2} (B)$	Inner join
Natural Join	$\bowtie$	\bowtie	$A \bowtie B$	Inner join on same column name
Equi Join	$\bowtie_{c}$	\bowtie_c	$A \bowtie_{A.column\ 2 = B.column\ 2} (B)$	Theta join with column condition being equal
Left Outer Join	$⟕$	\leftouterjoin*	$Student ⟕_{Student.SIN=Phone.SIN}(Phone))$	
Right Outer Join	$⟖$	\rightouterjoin*	$Phone⟖_{Phone.SIN=Student.SIN}(Student))$	
Full Outer Join	$⟗$	\fullouterjoin*	$A ⟗ B$	

* Need to add the following definition to your LaTeX project for special outer join symbols:

```
\def\ojoin{\setbox0=\hbox{$\bowtie$}\rule[-.02ex]{.25em}{.4pt}\llap{\rule[\ht0]{.25em}{.4pt}}}
\def\leftouterjoin{\mathbin{\ojoin\mkern-5.8mu\bowtie}}
\def\rightouterjoin{\mathbin{\bowtie\mkern-5.8mu\ojoin}}
\def\fullouterjoin{\mathbin{\ojoin\mkern-5.8mu\bowtie\mkern-5.8mu\ojoin}}
```