# Appendix A

## Notation

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Defined</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \alpha(G) )</td>
<td>independence number of a graph ( G )</td>
<td>3.1.2</td>
</tr>
<tr>
<td>( \chi(G) )</td>
<td>chromatic number of a graph ( G )</td>
<td>3.1.1</td>
</tr>
<tr>
<td>( \sigma(G) )</td>
<td>domination number of a graph ( G )</td>
<td>3.1.3</td>
</tr>
<tr>
<td>( v(U) )</td>
<td>covering number of a set system ( U )</td>
<td>5.1.2</td>
</tr>
<tr>
<td>( v^*(U) )</td>
<td>exact covering number of a set system ( U )</td>
<td>5.1.2</td>
</tr>
<tr>
<td>( \omega(G) )</td>
<td>clique number of graph ( G )</td>
<td>3.1.2</td>
</tr>
<tr>
<td>( 2P )</td>
<td>two pair reduction</td>
<td>3.2.4</td>
</tr>
<tr>
<td>( A )</td>
<td>autonomous reduction</td>
<td>3.2.1</td>
</tr>
<tr>
<td>( b(G, u, v) )</td>
<td>minimum ( u-v ) bottleneck distance in graph ( G )</td>
<td>4.1.1</td>
</tr>
<tr>
<td>( b(U, B) )</td>
<td>bin packing number of a set ( U ) with bin capacity ( B )</td>
<td>5.1.1</td>
</tr>
<tr>
<td>( c(G, uv) )</td>
<td>cost of edge ( uv ) of graph ( G )</td>
<td>4.1</td>
</tr>
<tr>
<td>( C )</td>
<td>autonomous clique reduction</td>
<td>3.2.1</td>
</tr>
<tr>
<td>( \hat{C} )</td>
<td>quasi-autonomous clique reduction</td>
<td>3.2.5</td>
</tr>
<tr>
<td>( CEC )</td>
<td>change edge costs reduction</td>
<td>4.2.7</td>
</tr>
<tr>
<td>( CRT )</td>
<td>cut reachability reduction</td>
<td>4.2.2</td>
</tr>
<tr>
<td>Symbol</td>
<td>Definition</td>
<td>Defined</td>
</tr>
<tr>
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<td>------------------------------------------------</td>
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</tr>
<tr>
<td>$d(G, u, v)$</td>
<td>length of minimum $u$-$v$ path in graph $G$</td>
<td>4.1.1</td>
</tr>
<tr>
<td>$D(G)$</td>
<td>distance graph of graph $G$</td>
<td>4.1.1</td>
</tr>
<tr>
<td>DC</td>
<td>dominated column reduction</td>
<td>5.2.2</td>
</tr>
<tr>
<td>$\deg(G, v)$</td>
<td>degree of vertex $v$ of graph $G$</td>
<td>3.1</td>
</tr>
<tr>
<td>DF</td>
<td>dominant feasible set reduction</td>
<td>5.2.1</td>
</tr>
<tr>
<td>DF1</td>
<td>unique column reduction</td>
<td>5.2.1</td>
</tr>
<tr>
<td>$\text{dom}(A)$</td>
<td>domain of set of operations $A$</td>
<td>2.1</td>
</tr>
<tr>
<td>DR</td>
<td>dominated row reduction</td>
<td>5.2.3</td>
</tr>
<tr>
<td>DS</td>
<td>disconnected system reduction</td>
<td>5.2.4</td>
</tr>
<tr>
<td>$E(G)$</td>
<td>edge set of graph $G$</td>
<td>3.1</td>
</tr>
<tr>
<td>E</td>
<td>even pair reduction</td>
<td>3.2.4</td>
</tr>
<tr>
<td>$e\text{CRT}$</td>
<td>edge cut reachability reduction</td>
<td>4.2.2</td>
</tr>
<tr>
<td>$h(G)$</td>
<td>maximum weight of a vertex of graph $G$</td>
<td>3.2.3</td>
</tr>
<tr>
<td>LBD</td>
<td>local bottleneck distance reduction</td>
<td>4.2.6</td>
</tr>
<tr>
<td>LSC</td>
<td>local Steiner cost reduction</td>
<td>4.2.5</td>
</tr>
<tr>
<td>$\text{MST}(G)$</td>
<td>minimum spanning tree of graph $G$</td>
<td>4.1.1</td>
</tr>
<tr>
<td>$N(G, v)$</td>
<td>neighbourhood of vertex $v$ in graph $G$</td>
<td>3.1</td>
</tr>
<tr>
<td>NSC</td>
<td>nearest special or chord vertices reduction</td>
<td>4.2.3</td>
</tr>
<tr>
<td>$\varphi^\xi$</td>
<td>operator of reduction $\xi$</td>
<td>2.1</td>
</tr>
<tr>
<td>$R(U, u)$</td>
<td>set of sets containing $u$ in set system $U$</td>
<td>5.1</td>
</tr>
<tr>
<td>RD</td>
<td>row difference reduction</td>
<td>5.2.5</td>
</tr>
<tr>
<td>RC</td>
<td>reduced costs reduction</td>
<td>5.2.6</td>
</tr>
<tr>
<td>RT</td>
<td>reachability reduction</td>
<td>4.2.1</td>
</tr>
<tr>
<td>$s(G, u, v)$</td>
<td>minimum $u$-$v$ special distance in graph $G$</td>
<td>4.1.1</td>
</tr>
<tr>
<td>$S(U)$</td>
<td>ground set of set system $U$</td>
<td>5.1</td>
</tr>
<tr>
<td>S</td>
<td>subset reduction</td>
<td>3.2.2</td>
</tr>
<tr>
<td>$\tilde{S}$</td>
<td>superset reduction</td>
<td>3.2.2</td>
</tr>
<tr>
<td>SD</td>
<td>smaller special distances reduction</td>
<td>4.2.4</td>
</tr>
<tr>
<td>Symbol</td>
<td>Definition</td>
<td>Defined</td>
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<tr>
<td>SF</td>
<td>subset feasible set reduction</td>
<td>5.2.1</td>
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<tr>
<td>$t(G)$</td>
<td>weight of minimum Steiner tree for $G$</td>
<td>4.1</td>
</tr>
<tr>
<td>UC</td>
<td>under-constrained deletion</td>
<td>3.2.3</td>
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<tr>
<td>UC</td>
<td>over-constrained deletion</td>
<td>3.2.3</td>
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<tr>
<td>$V(G)$</td>
<td>vertex set of graph $G$</td>
<td>3.1</td>
</tr>
<tr>
<td>vCRT</td>
<td>vertex cut reachability reduction</td>
<td>4.2.2</td>
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<td>$w(G, v)$</td>
<td>weight of vertex $v$ of graph $G$</td>
<td>3.1</td>
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<td>$wdeg(G, v)$</td>
<td>weighted degree of vertex $v$ in graph $G$</td>
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<tr>
<td>$x^\xi$</td>
<td>vertex resulting from reduction $\xi$</td>
<td>3.2</td>
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<td>$x^\xi$</td>
<td>vertex subject to reduction $\xi$</td>
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<td>$X^\xi$</td>
<td>set of vertices subject to reduction $\xi$</td>
<td>3.2</td>
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<td>$x^\xi y^\xi$</td>
<td>edge subject to reduction $\xi$</td>
<td>4.2</td>
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<td>$A(A, I)$</td>
<td>set of all reductions from $A$ on $I$</td>
<td>6.1</td>
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<td>$\downarrow$</td>
<td>“are joinable” relation</td>
<td>2.1</td>
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<td>$\rightarrow$</td>
<td>“reduces to” relation</td>
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<td>$\rightarrow^*$</td>
<td>reflexive, transitive closure of $\rightarrow$</td>
<td>2.1</td>
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<tr>
<td>$G</td>
<td>X$</td>
<td>subgraph of $G$ induced by a vertex set $X$</td>
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