State Reduction

- Two states are said to be equivalent if, for each member of the set of inputs, they give exactly the same output and send the DFA either to the same state or to an equivalent state. – When two states are equivalent, one of them can be removed without altering the input-output relationship.

	Next State		Output	
Present State	**x = 0**	**x = 1**	**x = 0**	**x = 1**
a	*a*	*b*	0	0
b	*c*	*d*	0	0
c	*a*	*d*	0	0
d	*e*	*f*	0	1
e	*a*	*f*	0	1
f	*g*	*f*	0	1
g	*a*	*f*	0	1

- Look for two states that are equivalent: next states must be identical; both have the same output given the same input. States **g** and **e** are equivalent.
- Recreate the table, removing the last row in the table and substituting *e* for every remaining instance of *g*.

	Next State		Output	
Present State	**x = 0**	**x = 1**	**x = 0**	**x = 1**
a	*a*	*b*	0	0
b	*c*	*d*	0	0
c	*a*	*d*	0	0
d	*e*	*f*	0	1
e	*a*	*f*	0	1
f	*e*	*f*	0	1

- Look for two states that are equivalent: next states must be identical; both have the same output given the same input. States **d** and **f** are equivalent.
- Recreate the table, removing the last row in the table and substituting *d* for every remaining instance of *f*.

	Next State		Output	
Present State	**x = 0**	**x = 1**	**x = 0**	**x = 1**
a	*a*	*b*	0	0
b	*c*	*d*	0	0
c	*a*	*d*	0	0
d	*e*	*d*	0	1
e	*a*	*d*	0	1