Solution 1

Expr : { u+v, a*b, w+v }

BB	Gen	Kill
B1	1 0 0	0 0 0
B2	0 0 0	0 0 1
B3	0 0 0	0 0 0
B4	0 0 1	0 0 0
B5	0 1 0	0 0 0
B6	0 0 0	0 1 0
B7	0 0 0	0 0 0
B8	0 1 0	0 0 0
B9	1 0 0	0 0 0

	Iteration 1		Iteration 2	
BB	In	Out	In	Out
B1	0 0 0	1 0 0	0 0 0	1 0 0
B2	1 0 0	1 0 0	1 0 0	1 0 0
B3	1 0 0	1 0 0	1 0 0	1 0 0
B4	1 0 0	1 0 1	1 0 0	1 0 1
B5	1 0 0	1 1 0	1 0 0	1 1 0
B6	1 1 0	1 0 0	1 1 0	1 0 0
B7	1 1 0	1 1 0	1 1 0	1 1 0
B8	1 0 0	1 1 0	1 0 0	1 1 0
B9	1 0 0	1 0 0	1 0 0	1 0 0

Iteration 1 and 2 gives same information, we will reach a fixed point after 2nd pass.

Solution 2

BB	Gen	Kill
B9	{ u, v }	ϕ
B8	{ a, b }	ϕ
B7	ϕ	ϕ
B6	ϕ	ϕ
B5	ϕ	{ a }
B4	ϕ	{ w }
B3	ϕ	ϕ
B2	ϕ	ϕ
B1	ϕ	{ u }

	Iteration 1		Iteration 2		Iteration 3	
BB	**Out**	**In**	**Out**	**In**	**Out**	**In**
B9	ϕ	{ u,v }	ϕ	{ u,v }	ϕ	{ u,v }
B8	{ u,v }	{ u,v,a,b }	{ u,v }	{ u,v,a,b }	{ u,v }	{ u,v,a,b }
B7	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }
B6	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }	{ u,v,a,b }
B5	{ u,v,a,b }	{ u,v,b }	{ u,v,a,b }	{ u,v,b }	{ u,v,a,b }	{ u,v,b }
B4	ϕ	ϕ	{ u,v }	{ u,v }	{ u,v }	{ u,v }
B3	{ u,v }	{ u,v }	{ u,v }	{ u,v }	{ u,v }	{ u,v }
B2	{ u,v }	{ u,v }	{ u,v }	{ u,v }	{ u,v }	{ u,v }
B1	{ u,v,b }	{ v,b }	{ u,v,b }	{ v,b }	{ u,v,b }	{ v,b }

Iteration 2 and 3 gives same information, we will reach a fixed point after 3rd pass.

Solution 3

This is a sample solution, there can be variations based on the description provided.

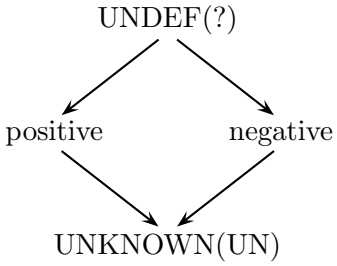
Assumption

? = UNDEF
pe = positive even
po = negative odd
ne = positive even
no = negative odd
UN = UNKNOWN

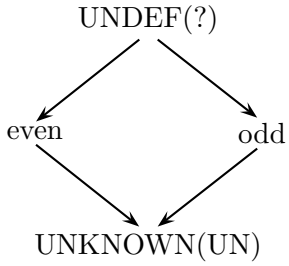
Direction of analysis

Forward

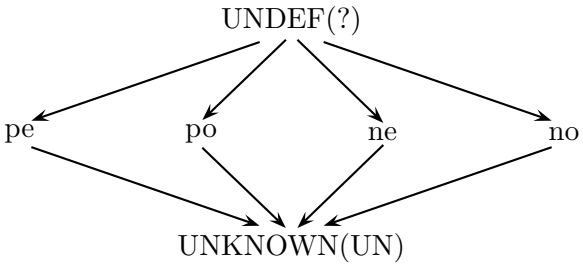
Component lattice



Lattice for positive-negative integers



Lattice for odd-even integers



Lattice after merging the two component lattice

Boundary information and meet operation

In(Entry) = ?
meet of two values can be obtained through lattice.

Transfer Functions

x = c

where x is variable and c is constant

$Out_n = \{x \rightarrow type(c)\}$

type(c) returns one of the values from set { po, pe, no, ne} depending upon the type of constant.

x = y

where x and y both are variables

$Out_n = \{x \rightarrow type_v(y)\}$

$type_v$(y) returns one of the values from set { ?, po, pe, no, ne, UN} depending upon the In information of variable y.

x = y + z

where x, y and z are variables

$Out_n = \{x \rightarrow eval_+(y, z)\}$

$eval_+$						
y \ z	**?**	**pe**	**po**	**ne**	**no**	**UN**
?	?	?	?	?	?	UN
pe	?	pe	po	UN	UN	UN
po	?	po	pe	UN	UN	UN
ne	?	UN	UN	ne	no	UN
no	?	UN	UN	no	ne	UN
UN	UN	UN	UN	UN	UN	UN

x = y * z

where x, y and z are variables

$Out_n = \{x \rightarrow eval_*(y, z)\}$

$eval_*$						
y \ z	**?**	**pe**	**po**	**ne**	**no**	**UN**
?	?	?	?	?	?	UN
pe	?	pe	pe	ne	ne	UN
po	?	pe	po	ne	no	UN
ne	?	ne	ne	pe	pe	UN
no	?	ne	no	pe	po	UN
UN	UN	UN	UN	UN	UN	UN