ASSIGNMENT 2 : Matteo Battilori, Samuel Di Marzo, Raimondo Iannone

1) Very Busy Expressions

	Dataflow problem
Domain	sets of expressions
Direction	backward $in[b] = f_b(out[b])$ $out[b] = \cap in[succ[(b)]$
Transfer function	$f_b(x) = Use_b \cup (x\text{-}Def_b)$
Meet operation	$\cap$
Boundary condition	$in[exit] = \varnothing$
Initial interior points	$in[b] = \mu$

	iteration 1	
	in[b]	out[b]
BB1	∅	b-a
BB2	b-a	b-a
BB3	b-a, a-b	a-b
BB4	a-b	∅
BB5	b-a	∅
BB6	∅	a-b
BB7	a-b	∅
BB8	∅	∅

2) Dominator Analysis

	Dataflow problem
Domain	sets of basic blocks
Direction	forward $out[b] = f_b(in[b])$ $in[b] = \cap out[pred(b)]$
Transfer function	$f_b(x) = B \cup x$
Meet operation	$\cap$
Boundary condition	$out[entry] = \varnothing$
Initial interior points	$out[b] = \mu$

	iteration 1	
	in[b]	out[b]
A	∅	A
B	A	A, B
C	A	A, C
D	A, C	A, C, D
E	A, C	A, C, E
F	A, C	A, C, F
G	A	A, G

3) Constant Propagation Analysis

	Dataflow problem
Domain	sets of variables and constant values
Direction	forward $out[b] = f_b(in[b])$ $in[b] = \cap\ out[pred(b)]$
Transfer function	$f_b(x) = Def_b \cup (x\text{-}Kill_b)$
Meet operation	∩
Boundary condition	out[entry] = ∅
Initial interior points	out[b] = μ

	iteration 1		iteration 2		iteration 3	
	in[b]	out[b]	in[b]	out[b]	in[b]	out[b]
1	∅	∅	X	X	X	X
2	∅	k = 2	X	X	X	X
3	k = 2	k = 2	X	X	X	X
4	k = 2	k = 2, a = 4	X	X	X	X
5	k = 2, a = 4	k = 2, a = 4, x = 5	X	X	X	X
6	k = 2	k = 2, a = 4	X	X	X	X
7	k = 2, a = 4	k = 2, a = 4, x = 8	X	X	X	X
8	k = 2, a = 4	k = 4, a = 4	X	X	X	X
9	k = 4, a = 4	k = 4, a = 4	a = 4	a = 4	a = 4	a = 4
10	k = 4, a = 4	k = 4, a = 4, b = 2	a = 4	a = 4, b = 2	a = 4	a = 4, b = 2
11	k = 4, a = 4, b = 2	k = 4, a = 4, b = 2, x = 8	a = 4, b = 2	a = 4, b = 2	a = 4, b = 2	a = 4, b = 2
12	k = 4, a = 4, b = 2, x = 8	k = 4, a = 4, b = 2, x = 8, y = 8	a = 4, b = 2	a = 4, b = 2, y = 8	a = 4, b = 2	a = 4, b = 2, y = 8
13	k = 4, a = 4, b = 2, x = 8, y = 8	k = 5, a = 4, b = 2, x = 8, y = 8	a = 4, b = 2, y = 8	a = 4, b = 2, y = 8	a = 4, b = 2, y = 8	a = 4, b = 2, y = 8
14	k = 4, a = 4	k = 4, a = 4	a = 4	a = 4	a = 4	a = 4
15	X	X	X	X	X	X