Complete functionel specification of Hack ALU

	zx	nx	zy	ny	f	no	out
0	1	0	1	0	1	0	0
1	1	1	1	1	1	1	+1
-1	1	1	1	0	1	0	-1
x	0	0	1	1	0	0	x
y	1	1	0	0	0	0	y
!x	0	0	1	1	0	1	!x
!y	1	1	0	0	0	1	!y
-x	0	0	1	1	1	1	-x
-y	1	1	0	0	1	1	-y
x+1	0	1	1	1	1	1	x+1
y+1	1	1	0	1	1	1	y+1
x-1	0	0	1	1	1	0	x-1
y-1	1	1	0	0	1	0	y-1
x+y	0	0	0	0	1	0	x+y
x-y	0	1	0	0	1	1	x-y
y-x	0	0	0	1	1	1	y-x
x&y	0	0	0	0	0	0	x&y
x|y	0	1	0	1	0	1	x|y

FUNCTIONS

MEANING of the 6 CONTROLS

if (zx) then x = 0

if (nx) then x = !x (inverted)

if (zy) then y = 0

if (ny) then y = !y

if (f) then x + y ⇒ out

else x & y ⇒ out

if (no) then out = !out

MEANING of the 2 OUTPUTS

if out = 0 then (zr) = 1

else (zr) = 0

if out < 0 then (ng) = 1

else (ng) = 0