Another example: constant propagation

Goal: data flow analysis that implements constant propagation

What info computed for each program point?

I is a conservative approximation to true info I_{true} iff:

Direction of analysis?

Initial info?

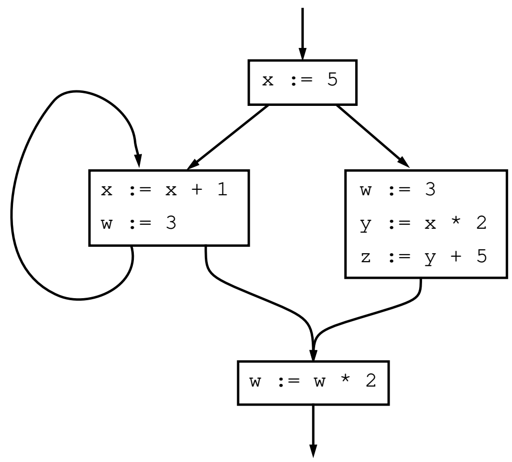
$CP_{\texttt{x := } N}(\text{in})$ =

$CP_{\texttt{x := y + z}}(\text{in})$ =

$CP_{\texttt{*p := *q + *r}}(\text{in})$ =

Merge function?

Example



May vs. must info

Other kinds of info imply guarantees: **must** info
Some kinds of info imply possibilities: **may** info

- the complement of **may** info is **must not** info

	May	Must
desired info	small set	big set
safe	overly big set	overly small set
GEN	add everything that might be true	add only if guaranteed true
KILL	remove only if guaranteed wrong	remove everything possibly wrong
MERGE	$\cup$	$\cap$
guess for back edge (optimistic)	$\varnothing$	universal set

Another example: live variables

Want the set of variables that are **live** at each pt. in program

- live: might be used later in the program
- supports dead assignment elimination, register allocation

What info computed for each program point?

I is a conservative approximation to true info I_{true} iff:

Direction of analysis?

Initial info?

$LV_{\texttt{x := x + y}}(\text{in})$ =

$LV_{\texttt{*p := *q + *r}}(\text{in})$ =

Merge function?

Example