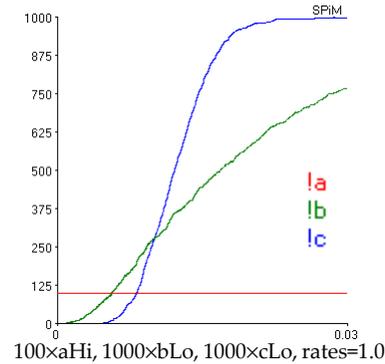
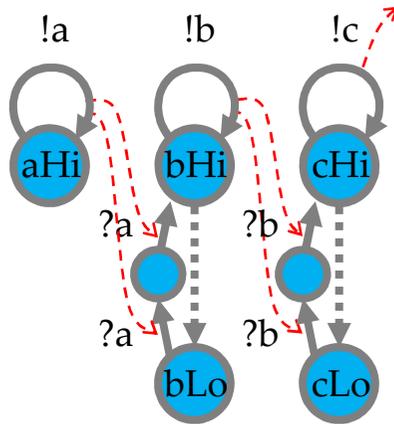


Exercise 1



Second-Order Regime cascade:
a signal amplifier (MAPK)
 $aHi > 0 \Rightarrow cHi = \max$

```
directive sample 0.03
directive plot !a: !b: !c

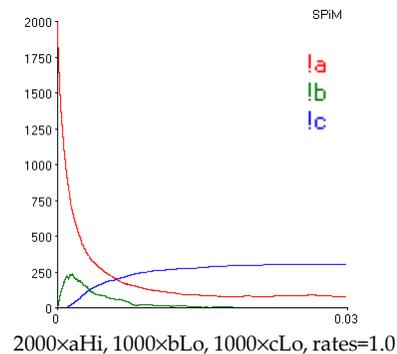
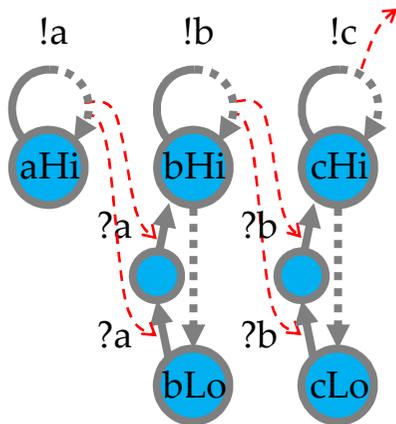
new a@1.0:chan new b@1.0:chan new c@1.0:chan

let Amp_hi(a:chan, b:chan) =
do !b: Amp_hi(a,b) or delay@1.0: Amp_lo(a,b)
and Amp_lo(a:chan, b:chan) =
?a: ?a: Amp_hi(a,b)

run 1000 of (Amp_lo(a,b) | Amp_lo(b,c))

let A() = !a: A()
run 100 of A()
```

Write these automata in
CGF and translate them
to chemical reactions.



Zero-Order Regime cascade:
a signal *divider*!
 $aHi = \max \Rightarrow cHi = 1/3 \max$

```
directive sample 0.03
directive plot !a: !b: !c

new a@1.0:chan new b@1.0:chan new c@1.0:chan

let Amp_hi(a:chan, b:chan) =
do !b: delay@1.0: Amp_hi(a,b) or delay@1.0: Amp_lo(a,b)
and Amp_lo(a:chan, b:chan) =
?a: ?a: Amp_hi(a,b)

run 1000 of (Amp_lo(a,b) | Amp_lo(b,c))

let A() = !a: delay@1.0: A()
run 2000 of A()
```