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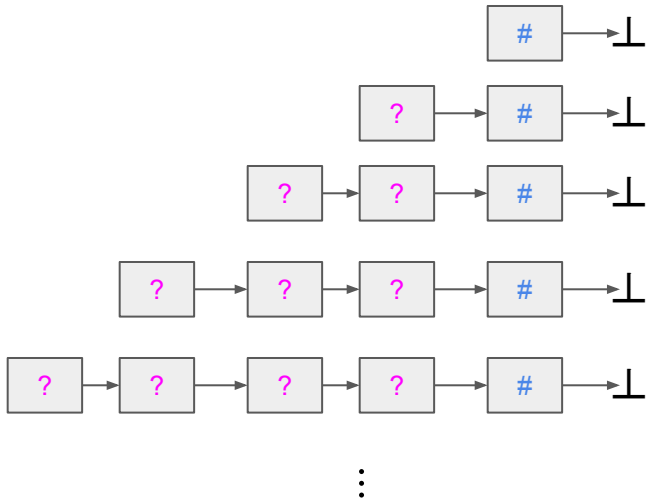

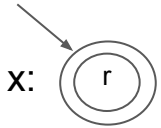


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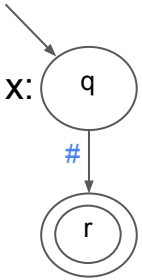
Predicates

∅

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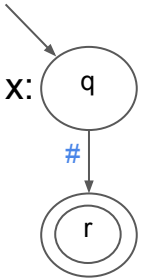
Predicates

∅

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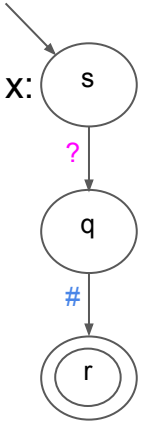
Predicates

∅

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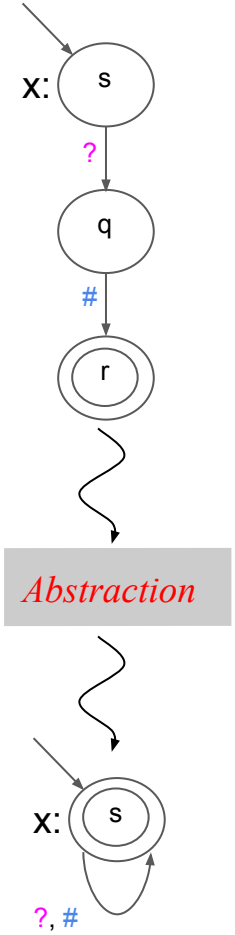
Predicates

∅

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```

Predicates

∅

Predicate languages abstraction collapses states whose languages have non-empty intersection with the same set of predicate languages (also represented by automata).

```
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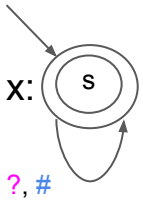
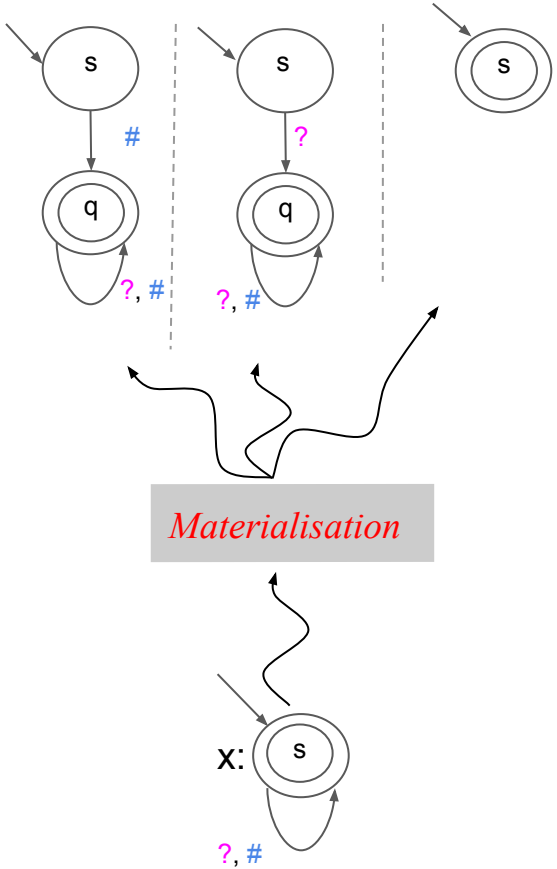
Predicates

∅



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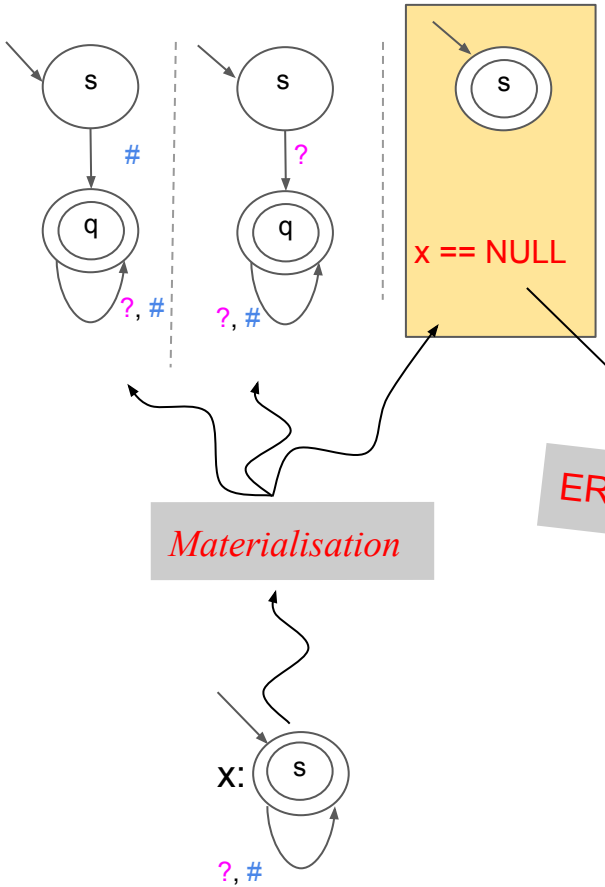
Predicates

∅

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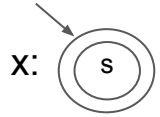
```

ERROR: Invalid dereference

Predicates

∅



Validate Counterexample

```
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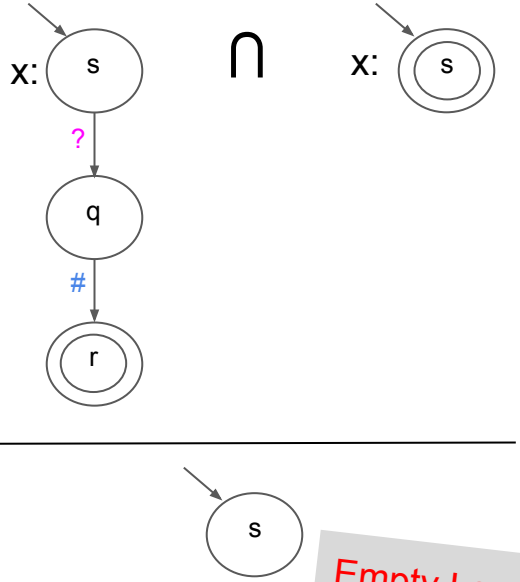
```

Predicates

∅

Forward automaton Backward automaton

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```
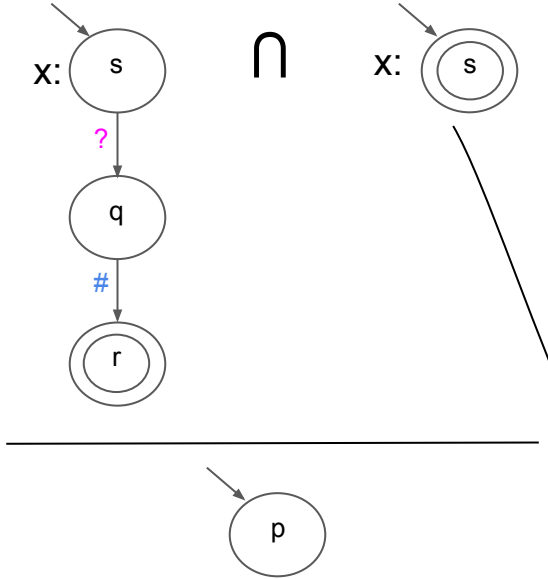

Predicates

∅

Empty Language - Spurious CE

Forward automaton Backward automaton

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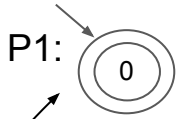
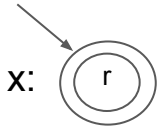
Predicates



Interpolating path to CE and obtaining a new predicate

Restarting the analysis

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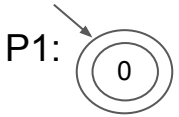
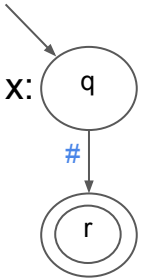
Predicates



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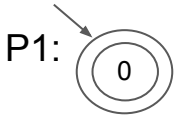
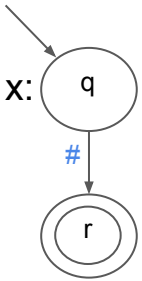
Predicates



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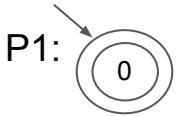
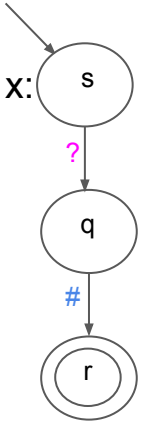
Predicates



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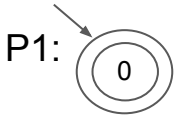

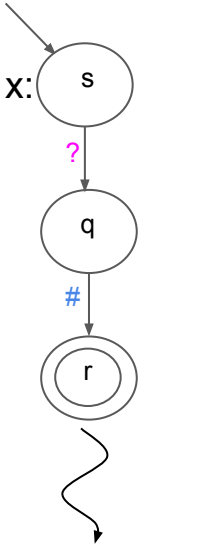

Abstraction

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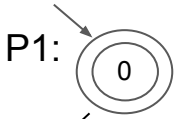
Predicates

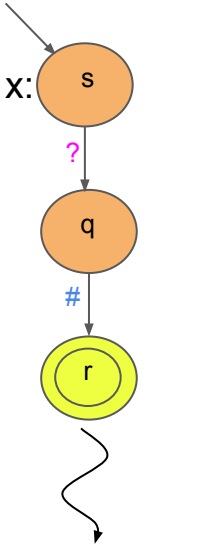


Intersection

$L(P1) \cap L(s) = \varnothing$

$L(P1) \cap L(q) = \varnothing$

$L(P1) \cap L(r) = \{\varepsilon\}$



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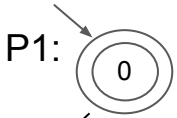
Predicates



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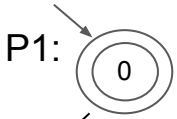
Predicates



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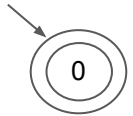
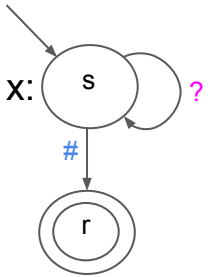
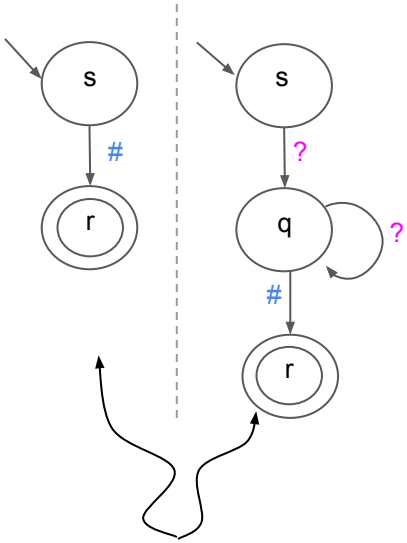
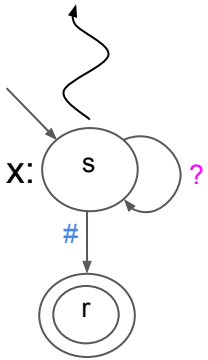
Predicates







Materialisation

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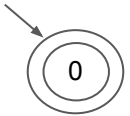
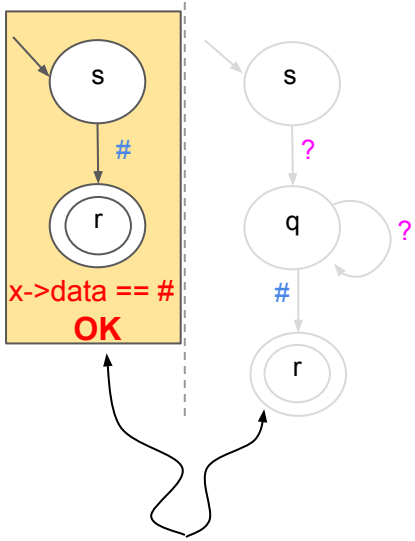
Valid dereference - exluded CE

Predicates





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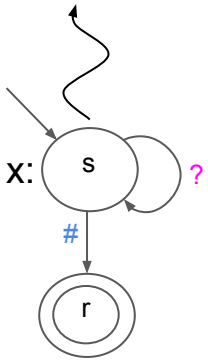


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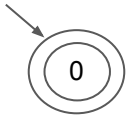
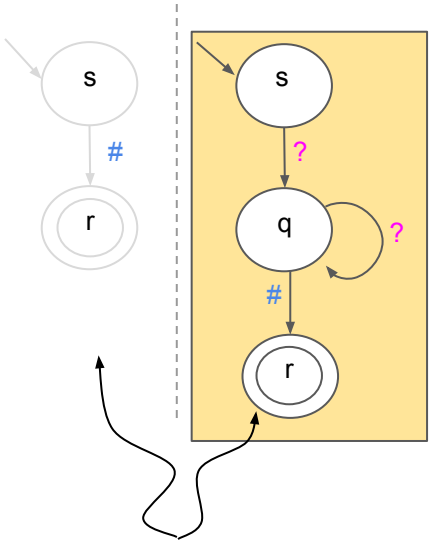
Predicates





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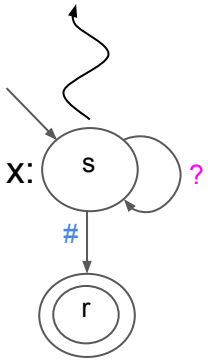


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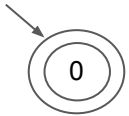
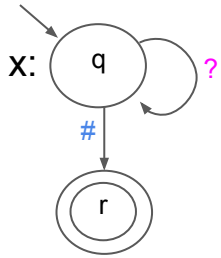
Predicates



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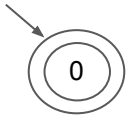
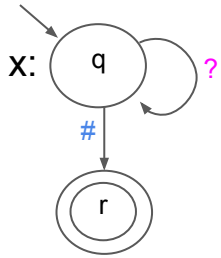
Predicates

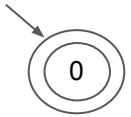





```
1.  list* x = new {.next=NULL, .data=#};
2.  while (nondet())
3.      y = x; x = new {.next=y, .data=?};

4.  while (x->data != #)
5.      x = x->next; assert(x != NULL);
```

Predicates



Program is safe

END