Tick those statements that you believe to be true:

- [ ] In the STRIPS representation, a world state can contain positive and negative facts, but in the propositional representation only positive facts are allowed in world states.
- [ ] In the STRIPS representation, an operator can have positive and negative preconditions, but in the propositional representation only positive preconditions are allowed in operators.
- [ ] In the STRIPS representation, an operator can have positive and negative effects, but in the propositional representation only positive effects are allowed in operators.
- [ ] In the STRIPS representation, a goal can have positive and negative components, but in the propositional representation only positive goals are allowed.
- [ ] Any problem that can be represented in the STRIPS representation can be translated into an equivalent problem is the propositional representation.

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The DWR domain can be modified to eliminate negative preconditions by replacing the `occupied` predicate with a new predicate: `free`. This has been done in the modified domain description. Of course, this also requires a modified problem. How many move actions would you expect to find in the propositional version of this problem?

modified domain description: https://spark-public.s3.amazonaws.com/aiplan/resources/dwr-operators-pos.txt
modified problem: https://spark-public.s3.amazonaws.com/aiplan/resources/dwr-problem1-pos.txt

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Earlier we looked at a very simple propositional DWR planning problem, where we had two robots at two locations and the robots had cranes on them, so they could autonomously load and unload containers. How many nodes would the first proposition layer P_0 of the planning graph for this problem contain?

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Have another look at the planning graph. How many state proposition symbols (nodes) will there be in P_4?

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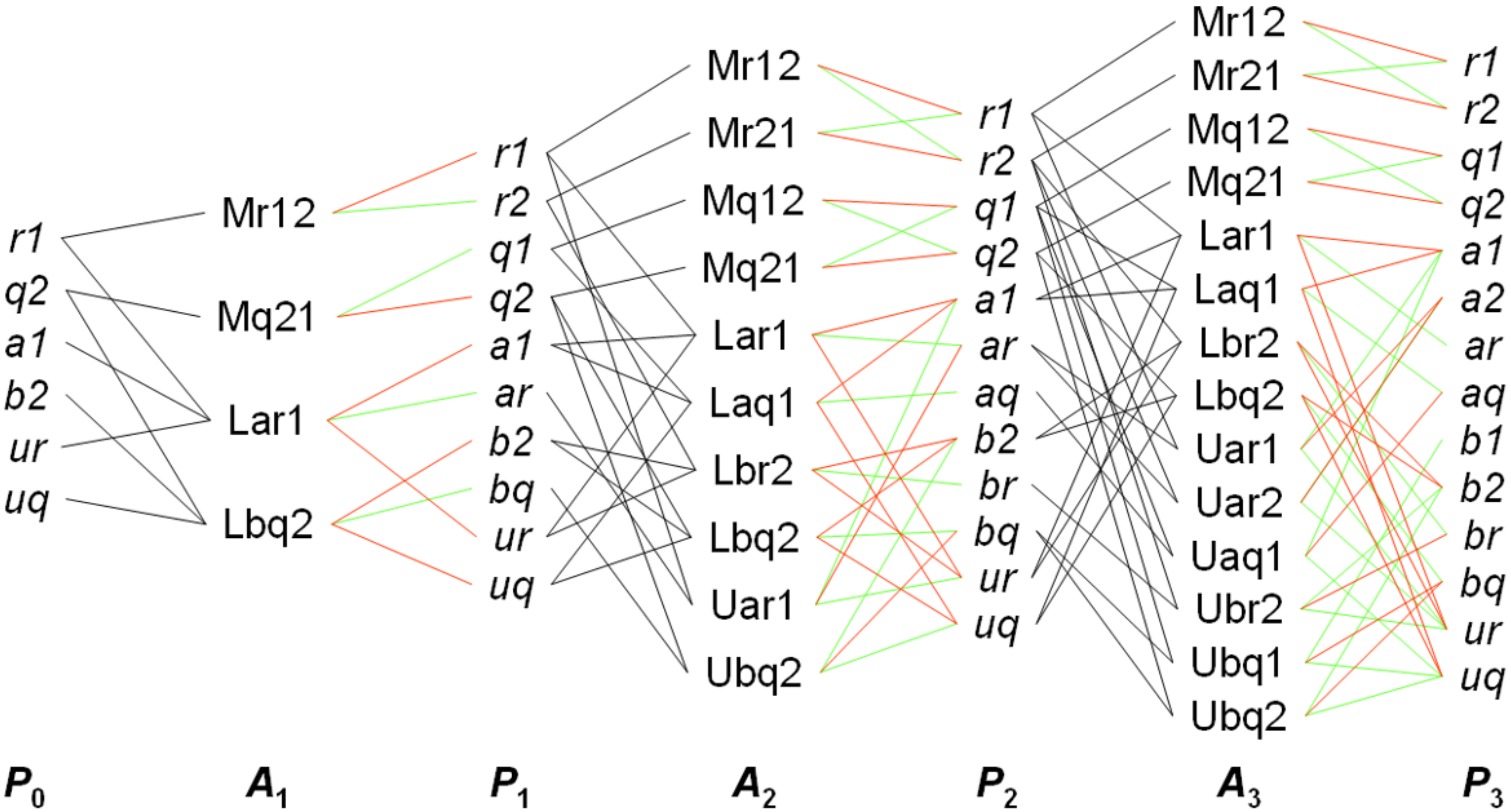

r1
q2
a1
b2
ur
uq
Mr12
Mq21
Lar1
Lbq2
r1
r2
q1
q2
a1
ar
b2
bq
ur
uq
Mr12
Mr21
Mq12
Mq21
Lar1
Laq1
Lbr2
Lbq2
Uar1
Ubq2
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r2
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Lar1
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Lbr2
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Uar1
Uar2
Uaq1
Ubr2
Ubq1
Ubq2
r1
r2
q1
q2
a1
a2
ar
aq
b1
b2
br
bq
ur
uq
P_0
A_1
P_1
A_2
P_2
A_3
P_3

Suppose that the planning graph for a given planning problem contains the state proposition *p* in layer P_k, but *p* is not contained in P_{k-1}. Which of the following statements must therefore be true?

- [ ] A state in which *p* is true can not be reached in *k*-1 steps.
- [ ] A state in which *p* is true can not be reached in *k* steps.
- [ ] A state in which *p* is true can always be reached in *k*-1 steps.
- [ ] A state in which *p* is true can always be reached in *k* steps.
- [ ] It is only a necessary criterion, so no definite conclusion is possible.

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Which of the following sets of actions are independent? Feel free to look at the planning graph where all the given actions are in action layer A_2.

- [ ] Mr12 and Mr21
- [ ] Mr12 and Mq12
- [ ] Mr12 and Uar1
- [ ] Mr12 and Ubq2
- [ ] Mr12, Lar1 and Ubq2

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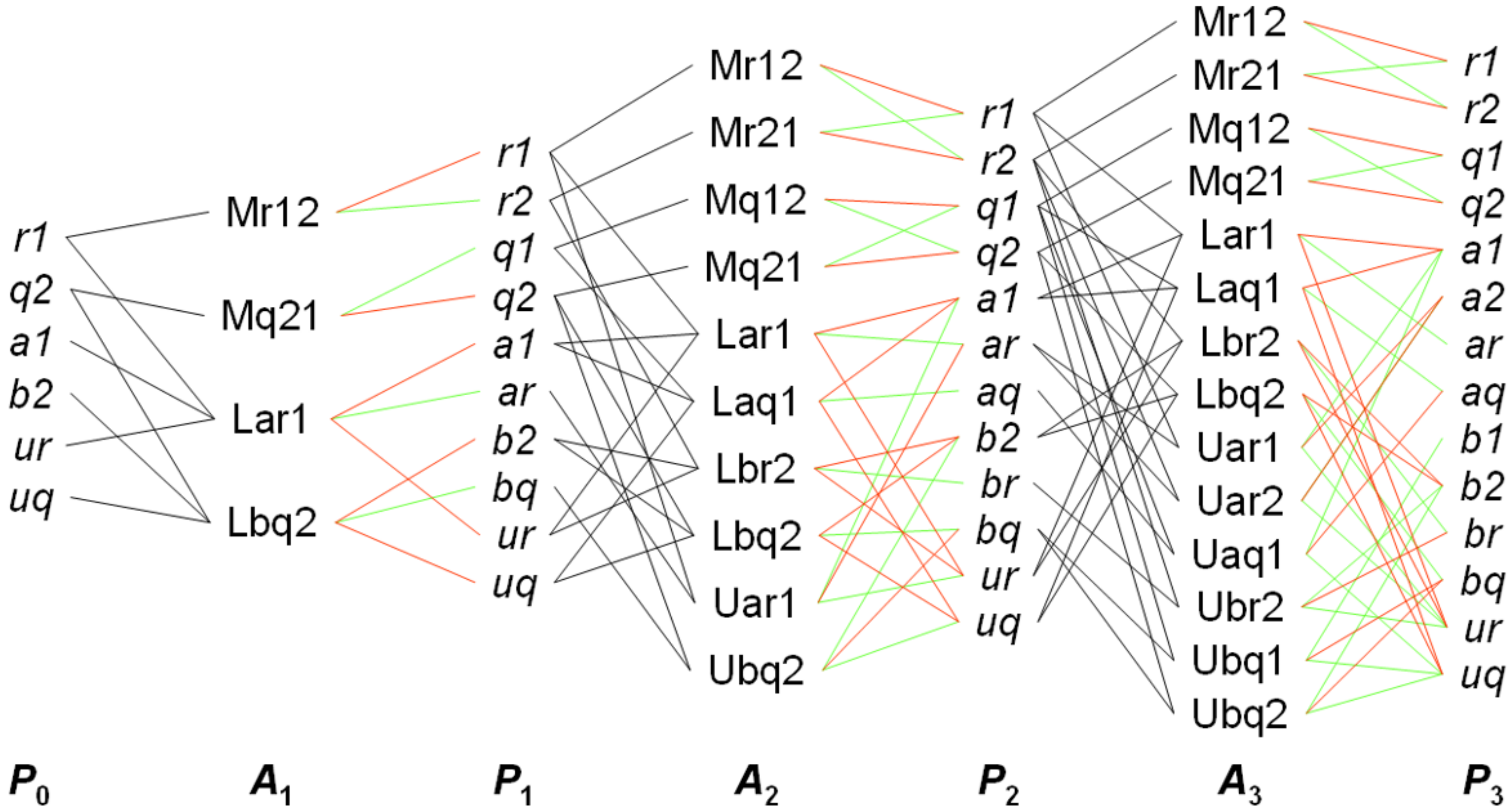

r1
q2
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Mr12
Mq21
Lar1
Lbq2
r1
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Uar1
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Ubr2
Ubq1
Ubq2
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q1
q2
a1
a2
ar
aq
b1
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br
bq
ur
uq
P_0
A_1
P_1
A_2
P_2
A_3
P_3

Layered plans represent a compromise between the simplicity of total-order plans, and the flexibility of partial-order plans. Tick those statements that you believe to be true:

- [ ] Every layered plan can be transformed into exactly one equivalent total-order plan.
- [ ] Every layered plan can be transformed into exactly one equivalent partial-order plan.
- [ ] Every total-order plan can be transformed into exactly one equivalent layered plan.
- [ ] Every partial-order plan can be transformed into exactly one equivalent layered plan.

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