height.

P8q7 WFC

(a) Write the initial state description using a representation of your choice. [4 marks]
(b) Write definitions of the four actions, providing at least some obvious preconditions, additions and
deletions. [12 marks].
(c) Suppose the monkey wants to fool the observers, who have gone to lunch, by grabbing the bananas but leaving the box in its original place. Write this as a goal (but not assuming the box is
necessarily at location C) in the language of situation calculus. [2 marks]
(d) If the box is filled with bricks, its position will remain the same when the Push operator is applied.
Is this an example of the frame problem or the circumscription problem? [2 marks]

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Answer

(a) In Prolog, represent states (or situations) as lists: s1 =
[at(monkey,a), at(bananas, b), at(box,c), holding(monkey, null),
height(monkey, floor)]

(b) In STRIPS,

```
Action: Go(X, From, To)
Preconditions: at(X,From)
Additions: at(X, To)
Deletions: at(X, From).

Action: Push(X, Obj, From, To)
Preconditions: at(X, From), at(Obj, From).
Additions: at(X, To), at(Obj, To).
Deletions: at(X, From), at(Obj, From).

Action: Climb(X, Obj)
Preconditions: at(X,Obj)
Additions: height(X, Obj).
Deletions: []

Action: Grasp(X, Obj)
Preconditions at(X, Loc), at(Obj, Loc), height(X, H), holding(X, null), height(Obj, H).
Additions: holding(X, Obj).
Deletions: []
```

(c) First instantiate the box's location, then grab bananas, then push box back to original location:

```
        at(box, B, S0), get(monkey, bananas, S1), push(box, B, S2).
```

This assumes the usual get-the-bananas routine is given by get().

(d) circumscription, because this is not a question of affecting the state of objects other than the one acted upon. Forgetting to add a "too heavy" precondition is a circumscription oversight, not a missing frame axiom.

AI Question 2 WFC

Consider the following story of the play MacBeth, by William Shakespeare:

The characters are Macbeth, Lady-Macbeth, Duncan and Macduff. Macbeth is an evil noble. Lady-Macbeth is a greedy ambitious woman. Duncan is a king. Macduff is a loyal noble. Macbeth is weak because Macbeth married Lady-Macbeth and because Lady-Macbeth is greedy. Lady-Macbeth persuades Macbeth to want to be king. Macbeth murders Duncan using a knife because Macbeth wants to be king and because Macbeth is evil. Lady-Macbeth kills Lady-Macbeth. Macduff is angry because Macbeth murdered Duncan and because Macduff is loyal to Duncan. Macduff kills Macbeth.

Construct a semantic network representing the above story. [8 marks]

Show the chain of reasoning leading to Macduff killing Macbeth. [5 marks].

It is possible to change the story so that Lady-Macbeth is unable to persuade Macbeth to want to be king. Augment the story to provide a