Exercisesheet No.1

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Ex.1

$$(((P \vee Q) \Rightarrow R) \wedge (R \vee (P \wedge \neg Q))) \wedge \neg R$$

Translate the implication to an or-clause:

$$((\neg(P \vee Q) \vee R) \wedge (R \vee (P \wedge \neg Q)))\neg R$$

De Morgan:

$$(((\neg P \wedge \neg Q) \vee R) \wedge (R \vee (P \wedge \neg Q))) \wedge \neg R$$

Distributivity:

$$((\neg P \vee R) \wedge (\neg Q \vee R) \wedge (R \vee P) \wedge (R \vee \neg Q)) \wedge \neg R$$

Distributivity (inverse):

$$(R \vee (\neg P \wedge \neg Q \wedge P \wedge \neg Q)) \wedge \neg R$$

Complements over P $((\neg P \wedge \neg Q \wedge P \wedge \neg Q)$ =false):

$$R \wedge \neg R$$

We are ending up with a contradiction.

Ex.2

$Init(Room(Room1) \wedge Room(Room2) \wedge Room(Room3) \wedge Room(Room4) \wedge Switch(s1) \wedge Switch(s2) \wedge Switch(s3) \wedge Switch(s4) \wedge Box(b1) \wedge Box(b2) \wedge Box(b3) \wedge Box(b4) \wedge At(Shakey, Floor) \wedge In(Shakey, Room3) \wedge TurnedOn(s4) \wedge TurnedOff(s3) \wedge TurnedOff(s2) \wedge TurnedOn(s1) \wedge In(b1, Room1) \wedge In(b2, Room1) \wedge In(b3, Room1) \wedge In(b4, Room1) \wedge At(b1, a) \wedge At(b2, b) \wedge At(b3, c) \wedge At(b4, d) \wedge At(Shakey, e))$

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Action(Go(x,y,r)),
  PRECOND: $At(Shakey, x) \land In(x, r) \land In(y, r)$
  EFFECT: $At(y, Shaky) \land \neg At(x, Shaky)$

Action(Push(b,x,y,r)),
  PRECOND: $At(b, x) \land In(x, r) \land In(y, r) \land In(Shakey, r) \land \neg At(Shakey, x) \land Box(b)$
  EFFECT: $At(b, y) \land \neg At(b, x)$

Action(ClimbUp(x,b)),
  PRECOND: $In(b, r) \land In(x, r) \land At(Shakey, x) \land \neg At(b, x) \land On(Shakey, Floor)$
  EFFECT: $\neg On(Shakey, Floor) \land On(Shakey, b) \neg At(Shakey, x)$

Action(ClimbDown(b,x)),
  PRECOND: $In(x, r) \land In(b, r) \land \neg At(b, x) \land On(Shakey, b)$
  EFFECT: $\neg On(Shakey, Floor) \land On(Shakey, b) \neg At(Shakey, x)$

Action(TurnOn(s,b)),
  PRECOND: $On(Shakey, b) \land \neg On(Shakey, Floot) \land At(b, s) \land At(Shakey, s)$
  EFFECT: $TurnedOn(s)$

Action(TurnOff(s,b)),
  PRECOND: $On(Shakey, b) \land \neg On(Shakey, Floot) \land At(b, s) \land At(Shakey, s)$
  EFFECT: $TurnedOff(s)$

Plan:
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