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:

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

Remove contradicting statements (($\neg P \wedge \neg Q$) and ($P \wedge \neg Q$) can never be true at the same time)):

$$(R \wedge R) \wedge \neg R$$

A literal AND the same literal is the same as just writing the literal:

$$R \wedge \neg R$$

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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