Model Checking
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Exercise Sheet 2

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Exercise 1 (LT Proterties): 6,5 / 16   6,5 / 100

a) (i) $P_{Winter\ is\ coming.}$ = set of infinite words $A_0, A_1, A_2...$ s.t. $\exists i \geq 0 : winter \in A_i$ ✓

(ii) $P_{Everything\ is\ awesome.}$ = set of infinite words $A_0, A_1, A_2...$ s.t. $\forall i \in \mathbb{N} : awesome \in A_i$ ✓

(iii) $P_{I'll\ be\ back.}$ = set of infinite words $A_0, A_1, A_2...$ s.t. $here \in A_0$
and $\exists i > 0 : here \notin A_i$ and $\exists j > i : here \in A_i$. ✓

(iv) P_{hero} = set of infinite words $A_0, A_1, A_2...$ s.t.

$$\exists i > 0 : (\forall j < i : \{live, hero\} \subseteq A_i$$
$$\wedge ((\forall j \geq i : live \notin A_j \wedge hero \in A_j)$$
$$\vee (\forall j \geq i : hero \notin A_j \wedge live \in A_j))) \quad ✓$$

(v) P_{poem} = set of infinite words $A_0, A_1, A_2...$ s.t. **aquivalent to** $\{form_a\} = A_0$

$$\exists i > 0 : (\forall 0 \leq 2j < i : A_j \cap \{form_2, true\_form, day, kiss\} = \emptyset \wedge form_1 \in A_0)$$
$$\wedge (\forall 2 j < i : A_j \cap \{form_1, true\_form, kiss\} = \emptyset \wedge \{form_2, day\} \subseteq A_j) \quad -0{,}5$$
$$\wedge kiss \in A_i \wedge (\forall j \geq i : true\_form \in A_j) \quad \{form_2, day\} = A_j$$

(vi) P_{debt} = set of infinite words $A_0, A_1, A_2...$ s.t.

$$\exists i \leq 0 : (\forall j > i : in\_dept \in A_j) \vee ((\forall j > i : in\_dept \notin A_j) \quad -1$$

$(\Rightarrow\ i=0)$ " a Lannister is always in debt "
What this means: or
a Lannister is always not in debt

(vii)

(viii)

b) (i)

(ii)

Exercise 2 (Closure of LT Properties):

Aufgabe 3 (Finite Trace Equivalence and Safety Properties)

Aufgabe 4 (Safety and Liveness Prperties)

a)

b)

c)