MM
$Mfftrue$
$APAPM =$
$(S, S_0, , L)$
S
$S_0 \subseteq$
S
$\subseteq$
$S\times$
$S \forall s \in$
$Ss' \in$
Sss'
$L:$
$S \to$
$2^{AP} LSAP$
$Ms\pi =$
$s_0, s_1, \ldots \ \ s =$
$s_0 i \geq$
$0 s_i s_{i+1}$
LTL??LTLCTLCTL*?
$APAP$

$$\phi ::= \top \mid \bot \mid P \mid \neg\phi \mid \phi_1 \wedge \phi_2 \mid \phi_1 \vee \phi_2 \mid AX\phi \mid EX\phi \mid AF\phi \mid EG\phi \mid A[\phi_1 R \phi_2] \mid E[\phi_1 U \phi_2]$$

$\top \bot P \in$
AP
$M =$
$(S, S_0, , L) APM, s \models$
$\phi \phi s \models$
$M, s \models$
$\top$
$M, s \models$
$\bot$
$M, s \models$
$Pp \in$
$L(s)$
$M, s \models$
$\neg\phi M, s \not\models$
ϕ
$M, s \models$
$\phi_1 \wedge$
$\phi_2 M, s \models$
$\phi_1 M, s \models$
ϕ_2
$M, s \models$
$\phi_1 \vee$
$\phi_2 M, s \models$
$\phi_1 M, s \models$
ϕ_2
$M, s \models$
$AX\phi \forall s' \in$
$\{s' \in$
$S \mid$
$ss'\} M, s' \models$
ϕ
$M, s \models$
$EX\phi \exists s' \in$
$\{s' \in$
$S \mid$
$ss'\} M, s' \models$
ϕ
$M, s \models$
$AF\phi ss_0, s_1, \ldots i \geq$
$0 M, s_i \models$
ϕ
$M, s \models$
$AF\phi ss_0, s_1, \ldots i \geq$
$0 M, s_i \models$
ϕ
$M, s \models$
$A[\phi_1 R \phi_2] ss_0, s_1, \ldots j \geq$
$0 M, s_j \models$
$\phi_1 0 \leq$
$i <$
$j M, s_i \models$
$\phi_2 i \geq$
$0 M, s_i \models$
ϕ_2
$M, s \models$
$E[\phi_1 U \phi_2] ss_0, s_1, \ldots j \geq$
$0 M, s_j \models$
$\phi_2 0 \leq$
$i <$
$j M, s_i \models$
ϕ_1

P
$s \in$
S
$s =$
$\{s' \mid$
$ss'\}$
$s_0, ..., s_n$
$s_0, s_1, ...$
i
s_i
$s_{i+1} \in$
s_i
T
T
s
s
M
M
$M \equiv$
$(S, S_0, , \mathcal{P})(M)$

$$\phi ::= \begin{cases} \top | \bot | P(t_1, ..., t_n) | \neg P(t_1, ..., t_n) | \phi \wedge \phi | \phi \vee \phi | \\ AX_x(\phi)(t) | EX_x(\phi)(t) | AF_x(\phi)(t) | EG_x(\phi)(t) | \\ AR_{x,y}(\phi_1, \phi_2)(t) | EU_{x,y}(\phi_1, \phi_2)(t) \end{cases}$$

x
y
S
$t_1, ..., t_n$
S
??
$AXEX$
AF
EG
ϕ
x
AR
EU
ϕ_1
ϕ_2
x
y
$(t/x)\phi$
ϕ
x
t
$\phi_1 \phi_2 \equiv$
$\neg\phi_1 \vee$
ϕ_2
$EF_x(\phi)(t) \equiv$
$EU_{z,x}(\top, \phi)(t)$
$ER_{x,y}(\phi_1, \phi_2)(t) \equiv$
$EU_{y,z}(\phi_2, ((z/x)\phi_1 \wedge$
$(z/y)\phi_2))(t) \vee$
$EG_y(\phi_2)(t)$
z
ϕ_1
ϕ_2
$AG_x(\phi)(t) \equiv$
$\neg(EF_x(\neg\phi)(t))$
$AU_{x,y}(\phi_1, \phi_2)(t) \equiv$
$\neg(ER_{x,y}(\neg\phi_1, \neg\phi_2)(t))$
$AFEFAU$
EU
$ARERAG$
EG
MM
$M \models$
$\top$
$M \models$
$\bot$
$M \models$
$P(s_1, ..., s_n) \langle s_1, ..., s_n \rangle \in$
$PPMn$
$M \models$
$\neg P(s_1, ..., s_n) \langle s_1, ..., s_n \rangle \notin$
$PPMn$
$M \models$
$\phi_1 \wedge$
$\phi_2 M \models$
ϕ_1
$M \models$
ϕ_2
$M \models$
$\phi_1 \vee$
$\phi_2 M \models$
ϕ_1
$M \models$
ϕ_2
$M \models$
$AX_x(\phi_1)(s) s' \in$
$\mathsf{Next}(s) M \models$
$(s'/x)\phi_1$
$M \models$