MIDTERM REVIEW
Wednesday, March 18, 2015
Regular class

MIDTERM EXAM
Open book and notes (not Internet)
Saturday, March 21, 2015
8:00 am - 12:00 pm (4 hours)
Room LW-844

Assignment 6. Due: 03/09/15

14. Consider a modified grammar of Zones. The only difference is the definition of function *ALPHA*:

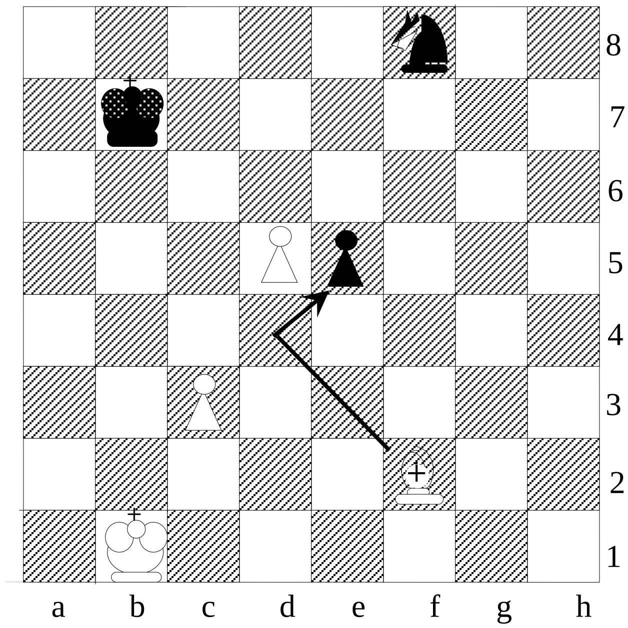
$$D(\boldsymbol{ALPHA}) = X \times P \times \mathbf{L_t}^{\boldsymbol{l_o}}(S) \times \mathbf{Z_+}$$

$$\boldsymbol{ALPHA}(x, p_o, t_o, k) = \begin{cases} \boldsymbol{min}(NEXTTIME(x), k), & \text{if } \boldsymbol{DIST}(x, p_o, t_o) < 2n, \\ NEXTTIME(x), & \text{if } \boldsymbol{DIST}(x, p_o, t_o) = 2n. \end{cases}$$

What is the impact of this new definition on the Zones to be generated by this grammar? Show examples of such Zones. Explain.

<u>Extra Credit</u>.
Do we have to change function *timer* in this case? See "Translations of Languages" in the textbook on LG. Explain.

Second Negation



1	Q_1	$S(u, v, w) \rightarrow A(u, v, w)$		*two*	ø
2_i	Q_2	$A(u, v, w) \rightarrow t(\,h_i^o(u), l_o+1)$ $A((0, 0, 0), g(h_i^o(u), w), zero)$	$TIME(z)=DIST(z, h_i^o(u))$	3	ø
3	Q_3	$A(u, v, w) \rightarrow A(f(u, v), v, w)$	$NEXTTIME(z)= init(u, NEXTTIME(z))$	*four*	5
4_j	Q_4	$A(u, v, w) \rightarrow t(h_j(u), TIME(y)))$ $A(u, v, g(h_j(u), w))$	$NEXTTIME(z)= ALPHA(z, h_j(u), TIME(y) - l_j+1)$	3	3
5	Q_5	$A(u, v, w) \rightarrow A((0, 0, 0), w, zero)$	$TIME(z) = NEXTTIME(z)$	3	6
6	Q_6	$A(u, v, w) \rightarrow e$		ø	ø

$Q_1(u) = (ON(p_o) = x) \wedge (MAP_{x,p_o}(y) \le l \le l_o) \wedge (\exists q\,((ON(q) = y) \wedge (OPPOSE(p_o, q))))$

$Q_2(u) = T$; $Q_3(u) = (x \ne n) \vee (y \ne n)$

$Q_4(u) = (\exists p\,((ON(p) = x) \wedge (l > 0) \wedge (x \ne x_o) \wedge (x \ne y_o)) \wedge ((\neg OPPOSE(p_o, p) \wedge (MAP_{x,p}(y) = 1)) \vee (OPPOSE(p_o, p) \wedge (MAP_{x,p}(y) \le l)))$ $Q_5(w) = (w \ne zero)$; $Q_6 = T$

$$init(u, r) = \begin{cases} 2n, & \text{if } u = (0,0,0), \\ r, & \text{if } u \ne (0,0,0). \end{cases}$$

$$f(u, v) = \begin{cases} (x+1, y, l), & \text{if } ((x \ne n) \wedge (l > 0)) \vee ((y = n) \wedge (l \le 0)) \\ (1, y+1, TIME(y+1) \times v_{y+1}), & \text{if } (x = n) \vee ((l \le 0) \wedge (y \ne n)). \end{cases}$$

Let $t_o \in L_t^{l_o}(S)$, $t_o = a(z_o)a(z_1)...a(z_m)$, $t_o \in t_{p_o}(z_o, z_m, m)$;

If $((z_m = y_o) \wedge (p = p_o) \wedge (\exists\, k\,(1 \le k \le m) \wedge (x = z_k))) \vee$
$(((z_m \ne y_o) \vee (p \ne p_o)) \wedge (\exists\, k\,(1 \le k \le m - 1) \wedge (x = z_k)))$
then $DIST(x, p_o, t_o) = k+1$ **else** $DIST(x, p_o, t_o) = 2n$

$$ALPHA(x, p_o, t_o, k) = \begin{cases} max\,(NEXTTIME(x), k), & \text{if } (DIST(x, p_o, t_o) \ne 2n) \wedge (NEXTTIME(x) \ne 2n); \\ k, & \text{if } DIST(x, p_o, t_o) \ne 2n) \wedge (NEXTTIME(x) = 2n); \\ NEXTTIME(x), & \text{if } DIST(x, p_o, t_o) = 2n). \end{cases}$$

$$g_r(p_o, t_o, w) = \begin{cases} 1, & \text{if } DIST(r, p_o, t_o) < 2n, \\ w_r, & \text{if } DIST(r, p_o, t_o) = 2n. \end{cases}$$

$$TRACKS_{p_o} = \{p_o\} \times (\bigcup_{1 \le k \le l} L[G_t^{(2)}(x, y, k, p_o)]$$

If $TRACKS_{p_o} = e$

then $h_i^o(u) = e$

else $TRACKS_{p_o} = \{(p_o, t_1), (p_o, t_2), \ldots, (p_o, t_b)\}, (b \le M)$ **and** $h_i^o(u) = \begin{cases} (p_o, t_i), & \text{if } i \le b, \\ (p_o, t_b), & \text{if } i > b. \end{cases}$

$TRACKS = \bigcup_{ON(p)=x} TRACKS_p$, where $TRACKS_p$ is the same as for h_i^o

If TRACKS = *e*

then $h_i(u) = e$

else $TRACKS = \{(p_1, t_1), (p_1, t_2), \ldots, (p_m, t_m)\}$, $(m \le M)$ **and** $h_i(u) = \begin{cases} (p_i, t_i), & \text{if } i \le m, \\ (p_m, t_m), & \text{if } i > m. \end{cases}$

At the beginning : $u = (x_o, y_o, l_o)$, $w = zero$, $v = zero$, $x_o \in X$, $y_o \in X$, $l_o \in \mathbf{Z}_+$, $p_o \in P$, and TIME(z)=2n, NEXTTIME(z)=2n for all z from X.