

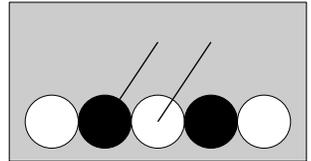
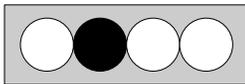
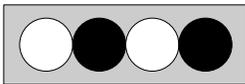
cmput 670 2026 homework 3

1. Recall $\uparrow = \{0|*\}$. Let $g = \uparrow *$. (a) Prove $g = \{*, \uparrow | 0, \uparrow\}$. (b) Prove $g = \{*, 0|0\}$.

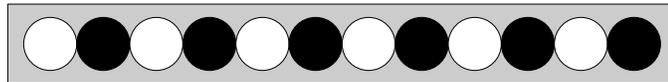
Recall $\uparrow\uparrow = \uparrow + \uparrow$. (c) Prove $\uparrow\uparrow = \{\uparrow | \uparrow *\}$. (d) Prove $\uparrow\uparrow = \{0 | \uparrow *\}$.

2. Let $\mathcal{O} = \{ \phi, 0, 1, -1, *, \{0, *\} \}$. For each S in \mathcal{O} and each T in \mathcal{O} , give the canonical form of $g = \{S|T\}$. Show your work (answers on the next page).

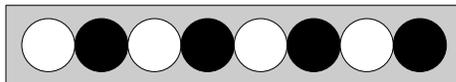
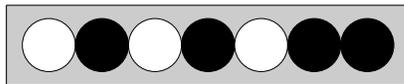
3. Prove the canonical forms of clobber games $ox4$, $oxoo$, $ox5$ are respectively $\pm\{*, \uparrow\}$, $\uparrow* = \{0, *|0\}$, $\{\uparrow | *\}$ (For $ox5$, diagram shows the two canonical moves).



4. According to CGSuite, $ox12 = ox4*$. Recall: the canonical form of $ox4*$ is $\pm\{0, \uparrow*\}$. Assume Left plays a clobber game that has $ox12$ as a subgame (connected component). On $ox12$, what are the only moves that Left needs to consider? Explain.



5. The canonical form of $xx7$ below is $\{\uparrow\uparrow | \downarrow*, \pm\{0, \uparrow*\}\}$. (a) Prove $\downarrow* < ox8$. (b) Prove the canonical form of $ox8$ is $\pm\{o5, ox4 \uparrow\}$.



1. answers

	ϕ	0	-1	1	*	$\{0, *\}$
ϕ	0	?	?	?	?	?
0	1	*	?	?	?	?
1	2	$\{1 \mid 0\}$	± 1	?	?	?
-1	0	$-\frac{1}{2}$	$-1*$	0	?	?
*	0	\downarrow	$\{*\mid -1\}$	0	0	?
$\{0, *\}$	1	$\uparrow*$	$\{0, *\mid -1\}$	$\frac{1}{2}$	\uparrow	$*2$