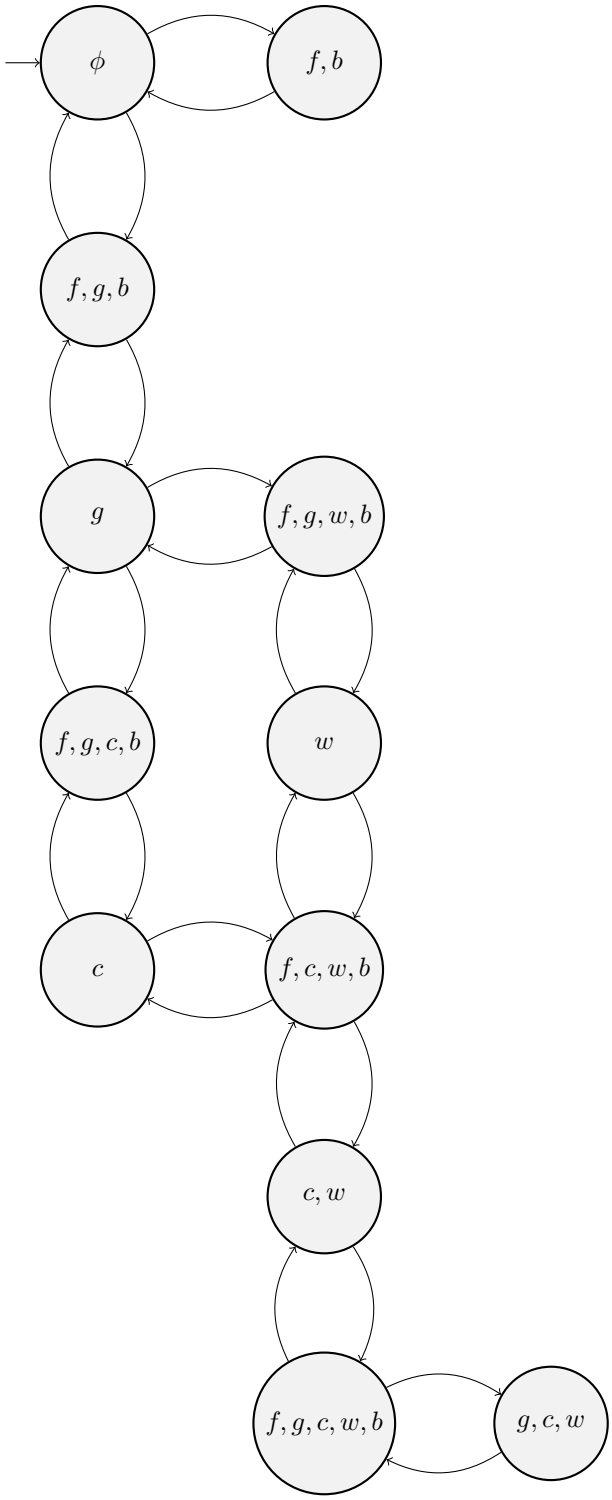
Formal Methods in SE: Homework #1

Due on 1/31 at 6:59 a.m.

Professor Ciardo

Charles Dudley

Problem 1



Problem 2

(a) Farmer can cross the river: $\mathcal{EF}f$

(b) Everyone can cross the river:
Interpreting as "everyone can be on the west side of the river *at the same time*" then $\mathcal{EF}(f \wedge c \wedge g \wedge w)$.
Otherwise $\mathcal{EF}f \wedge \mathcal{EF}c \wedge \mathcal{EF}g \wedge \mathcal{EF}w$.

(c) Everyone can cross the river safely in two or fewer river crossings (in any directions):
$\mathcal{EX}(f \wedge c \wedge g \wedge w) \vee \mathcal{EXEX}(f \wedge c \wedge g \wedge w)$

(d) Farmer and boat can be on different banks ($\mathcal{F}$): $\mathcal{EF}(f \oplus b)$

(e) Farmer and boat can be on different banks ($\mathcal{G}$): $\neg\mathcal{AG}(f \leftrightarrow b)$

(f) Farmer and boat can be on different banks ($\mathcal{U}$): $\mathcal{E}(\texttt{true})\mathcal{U}(f \oplus b)$

Problem 3

Everyone can cross the river without being eaten: $\mathcal{E}((w \oplus g) \wedge (g \oplus c))\mathcal{U}(f \wedge c \wedge g \wedge w)$