Consider the following solution to the producer / consumer problem:

\[ P \equiv \text{full} := 1; \text{empty} := 0; \text{i} := 0; \text{j} := 0; \text{cobegin PROD || CONS coend} \]

where

\[ \text{PROD} \equiv \text{while } \text{i} < \text{M} \text{ do} \]
\[ \text{x} := \text{a}[\text{i}]; \]
\[ \text{lock}(\text{empty}); \]
\[ \text{buffer} := \text{x}; \]
\[ \text{unlock}(\text{full}); \]
\[ \text{i} := \text{i} + 1; \]
\[ \text{end while} \]

and

\[ \text{CONS} \equiv \text{while } \text{j} < \text{M} \text{ do} \]
\[ \text{lock}(\text{full}); \]
\[ \text{y} := \text{buffer}; \]
\[ \text{unlock}(\text{empty}); \]
\[ \text{b}[\text{j}] := \text{y}; \]
\[ \text{j} := \text{j} + 1; \]
\[ \text{end while} \]

Requirements:
(1) Label the program;
(2) Convert the labeled program into a kripke structure,
(3) Let \( a[0] = 2 \), and \( a[1] = 5 \), and \( M = 2 \); draw the reachable state graph of the Kripke structure.