Assignment 7.1

Consider the procedure prune (from the lecture notes, with numbering for S and W corresponding to the iterations).

```plaintext
procedure prune(O,W,G);
    i := 0;
    W_0 := W;
    repeat
        i := i + 1;
        k := 0;
        S_0 := G; (* States from which G is reachable with 0 steps. *)
        repeat
            k := k + 1;
            S_k := S_{k-1} \cup \bigcup_{o \in O} (wpreim_o(S_{k-1}) \cap spreim_o(W_{i-1})); (* States from which G is reachable with k steps. *)
        until S_k = S_{k-1} (* States that stay within W_{i-1} and eventually reach G. *)
        W_i := W_{i-1} \cap S_k;
    until W_i = W_{i-1} (* States in W_i stay within W_i and eventually reach G. *)
    return W_i;
```

Consider the following transition graph (only one action o, which is nondeterministic in states e and c.)

Simulate the computation of prune when it is called with the following parameters: prune({o}, {a,b,c,d,e,f}, {a}). List the values of S_k and W_i for different values of k and i.
Assignment 7.2

Simulate the computation of the algorithm for maintenance goals for the following graph (there is only one action) and $G = \{a, b, c, d, e, f\}$.

Assignment 7.3

1. Let there be 3 state variables $A$, $B$ and $C$. Construct the transition matrix of the probabilistic operator

$$\langle B \rightarrow C, 0.5(A \triangleright B)|0.5(0.5(B \triangleright C)|0.5(A \triangleright C)) \rangle.$$

2. Outline an algorithm that constructs from any transition matrix a corresponding operator (assume that rows and columns correspond to valuations of state variables $x_1, \ldots, x_n$ for some $n$).

A brief outline of the idea of how the algorithm works suffices.

You may work on these assignments and submit your results in groups of two students. Make sure to clearly indicate both names on your work. You may write your answers in English or German.