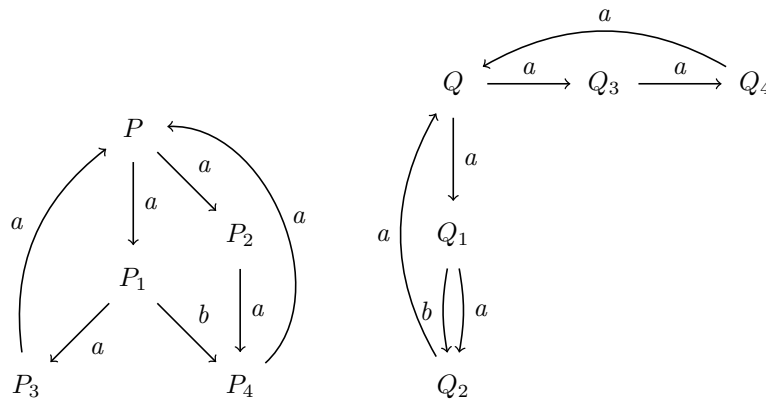# Assignment 8: CCS advanced concepts

ETH Zurich

1 Strong Bisimulation

Consider the following labelled transition system:

Show that $P \sim Q$ by finding a strong bisimulation $\mathcal{R}$ such that $P \, \mathcal{R} \, Q$.

2 Weak Bisimulation

Suppose we have the following definitions of processes

$$
\begin{aligned}
\mathrm{S} &\stackrel{\text{def}}{=} a.\overline{b}.\mathrm{S} \\
\mathrm{T} &\stackrel{\text{def}}{=} \overline{a}.e.b.\mathrm{T} \\
\mathrm{ST} &\stackrel{\text{def}}{=} (\mathrm{S} \,|\, \mathrm{T}) \smallsetminus \{a, b\}
\end{aligned}
$$

Further we have

$$
\begin{aligned}
\mathrm{U} &\stackrel{\text{def}}{=} e.x.y.\mathrm{U} \\
\mathrm{V} &\stackrel{\text{def}}{=} \overline{x}.\overline{y}.\mathrm{V} \\
\mathrm{UV} &\stackrel{\text{def}}{=} (\mathrm{U} \,|\, \mathrm{V}) \smallsetminus \{x, y\}
\end{aligned}
$$

Your task is to

1. Represent ST and UV as LTSs.

2. Show that ST and UV are weakly bisimilar.

3. Suppose we further have $\mathrm{UV}' \stackrel{\text{def}}{=} (\mathrm{U} \,|\, \mathrm{V}) \smallsetminus \{y\}$. Show that ST and UV' are not weakly bisimilar.