CS_175: Modelling Computing Systems 2 **Exercise 4**

Due: Problem Session in Week 9 (Friday 26 March 2020)

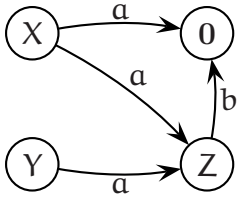
1. [**Exercise 4, page 354**]

   Consider the following 4-state transition system.

$$X \stackrel{\text{def}}{=} a.\mathbf{0} + Y$$

$$Y \stackrel{\text{def}}{=} a.Z$$

$$Z \stackrel{\text{def}}{=} b.\mathbf{0}$$



   Fill in the following table with the states satisfying the relevant properties.
   (The first line has been filled in to get you started.)

property P	states satisfying P	negation $\neg$P	states satisfying $\neg$P
$\langle a \rangle true$	X, Y	$[a] false$	Z, **0**
$[a] true$			
$\langle b \rangle true$			
$[b] true$			
$\langle a \rangle \langle b \rangle true$			
$\langle a \rangle [b] true$			
$[a] \langle b \rangle true$			
$[a][b] true$			

2. [**Exercise 6, page 355**]

   Give a labelled transition system with a state s which satisfies all of the following:

   - $\langle a \rangle \Big(\langle a \rangle true \wedge \langle b \rangle \langle a \rangle true \Big)$
   - $\langle a \rangle \langle b \rangle \Big(\langle b \rangle true \wedge [a] false \Big)$
   - $\langle a \rangle \langle b \rangle \Big([a] false \wedge [b] false \Big)$

   Explain informally what each of the above properties are saying, and why they are true of the state s in your LTS.