RM

Definition: bookwork (Def^{n} 11.1 in lecture notes).

A set of agents respects a sorting ob if, for every summand of the form $x(\vec{y}).P$ or $\bar{x}\langle\vec{y}\rangle.P$, if $x:\sigma$ then $\vec{y}:ob(\sigma)$.

If $P \xrightarrow{\tau} P'$, then this must result from a communication within P between a summand $x(\vec{z}).R$ and $\bar{x}\langle\vec{y}\rangle.Q$, leading to a replacement $\{\vec{y}/\vec{z}\}$ in R. But because a sorting is respected by P we must have that $\vec{z}$ and $\vec{y}$ have equal sort; hence $\{\vec{y}/\vec{z}\}R$ will also respect the sorting, and all other parts of P' are as in P.

[5 marks]

$True = (b)\, b(tf).\bar{t}$, $False = (b)\, b(tf).\bar{f}$

$Cond(P,Q)(b) \stackrel{def}{=} (\nu tf)\, \bar{b}\langle tf\rangle.(t.P + f.Q)$ (assuming t,f not free in P,Q)

Then $Cond(P,Q)\langle b\rangle \mid True\langle b\rangle = \nu tf\, \bar{b}\langle tf\rangle.(t.P + f.Q) \mid b(tf).\bar{t}$

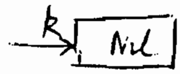
$\longrightarrow \nu tf((t.P+f.Q) \mid \bar{t}.0) \longrightarrow \nu tf(P \mid 0) \equiv P$.

A sorting is $\{BOOL, TRUE, FALSE\}$ with $ob(BOOL) = (TRUE\ FALSE)$

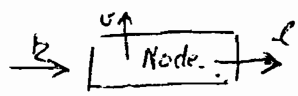
$ob(TRUE) = ob(FALSE) = ()$

[6 MARKS]

$Nil = (k)\, k(nc).\bar{n}$



$Node = (kvl)\, k(nc).\bar{c}\langle vl\rangle$



$Cons(V,L) = (k)\, \nu vl\, (Node\langle kvl\rangle \mid V\langle v\rangle \mid L\langle l\rangle)$

$Listcases(P,F) = (k)\, (\nu nc)\bar{k}\langle nc\rangle.(n.P + c.F)$

The reaction for $Listcases(P,F) \mid L\langle l\rangle$ is similar to that for Cond above.

[6 MARKS]

$$ob: \begin{cases} LISTS \longmapsto CHAN_0(\epsilon),\ CHAN_2(S, LISTS) \\ CHAN_n(S_1,\dots,S_n) \longmapsto S_1,\dots,S_n \end{cases}$$

[3 MARKS]