

As always, justify your answers. For each part of each problem, a few well-chosen sentences is sufficient justification. You may write more if you like.

Classic Paxos

1. In $Start_v^p$ on p. 10, suppose we delete the assignment $c^p := nil$. Is CP still safe (i.e., is it still a refinement of AP)?
2. Describe how a primary evaluates an expression like $(Q_{dec}[r_v^* = x])@p$. (This expression occurs in the definition of re_v^p on p. 10.) Mention the necessary communication as well as the necessary local computations. (This question just checks your understanding of the operational intentions underlying the abstract description of the algorithm.)

Byzantine Paxos (without Digital Signatures)

3. Explain why $anchor_u$, as opposed to $anchor_u^a$, is used in (B5) on p. 12.
4. Describe how an agent checks $x \in anchor_u$, which, by equation (B5), is needed to check whether $x \in anchor_v^a$, which is needed to evaluate the guard of $Choose_v^a$. Note that an agent does not need to compute the entire set $anchor_u$.

Notes

1. Regarding the invariant on p. 10, col. 1, line 13, I don't see how $active^p$ could ever be nil. I expected this invariant to be $active^p \Rightarrow active_{vp}$.
2. In the "table" on p. 10, col. 1, line -16 (i.e., 16th from the bottom), I suspect that $re_{vp}^p \notin X$ should be $re_{vp}^p \neq nil$ (cf. the guard of $Accept^p$ in Section 7.1).
3. I don't understand the expressions $c_v@a$ and $re_v^p@a$ on p. 10, col. 2, line 2, because c_v and re_v^p are not predicates. I expected these expressions to be something like c^{pv} and re_v^{pv} , respectively. Lamson's intentions come across better in the definitions of $Accept^p$ and $Finish^p$ in Section 7.1.
4. In Section 8.3, in the paragraph starting with "Now we consider", I think " $x \in anchor_u^a$ " should be " $(x \in anchor_u)@a$ ".
5. In the definition of $Choose_v^a$ in Section 8.1, the open parenthesis should be before " x " not before " c_v^{pv} ".