(2) Prove $r(u) = r(v)$, where $r(x)$ is the average of x's neighbors, for all $u, v \in V$.

1. Assume $r(u) \neq r(v)$ for all $u, v \in V$.
2. Also assume $r(v)$ is smallest member of V. (by well-ordering)
3. Then $r(v) \neq$ average of all neighbors.
   1. $r(v)$ is smallest member and $r(v) \neq r(u)$, then $r(u) > r(v)$.
   2. If $r(u) > r(v)$ and $r(v)$ is the average of $r(u)$ and its other neighbor, one or more of the other neighbors must be $< r(v)$. (by simple arithmetic/algebra)
   3. However, no neighbor can be $< r(v)$. (by assumption and well-ordering.)
   4. QED.
4. QED. (by contradiction)