1) ① inital conditions

   $\underline{\text{①}}_1 \equiv p3 \Rightarrow turn = 1$
   p2 guarantees turn = 1
   no interleaving could change
   this
   at p3, turn must = 1

   ② inductive
      cases:
         ⑨
            no changes in q are
      going to break the
      invariant

      ⟨ p3 - p4 ⟩

            changes turn to 2, however
         p2 guarantees the invariant
         still holds

2) $\overline{\text{①}}_2 \equiv q3 \Rightarrow turn = 2$

It is symmetrical to ①_1 and the
proof is the same

3) This is a deductive proof

Since: $A \Rightarrow C1$ is true and $B \Rightarrow C2$ is true and $A \vee B$ is true then $C1 \vee C2$ must be true.

4) $\Phi_1' =$ turn! $= 1 \Rightarrow \neg P3$

$\Phi_2' =$ turn! $= 2 \Rightarrow \neg q3$

5) "turn isn't 1" $=$ turn! $= 1$

 1. turn $= 2 \Rightarrow \neg P3$
 2. turn $= 1 \Rightarrow \neg q3$

6) Use the invariant From last Ex $(turn = 1 \vee turn = 2)$, and the invariants we just proved (Φ_1, Φ_2) and the logic from Question 3, and combine it all.