196 (earliest meeting time) Write a program to find the earliest meeting time acceptable to three people. Each person is willing to state their possible meeting times by means of a function that tells, for each time t, the earliest time at or after t that they are available for a meeting. (Do not confuse this t with the execution time variable. You may ignore execution time for this problem.)

After trying the question, scroll down to the solution.

§ Here are two solutions. They are the same computationally, but they use different specifications. The first is "backward-looking", stating that no previous time was acceptable. The second is "forward-looking". Which do you prefer?

Let the three functions be f, g, and h. Let *now* be the current time. Let $M\ t$ mean that t is an acceptable meeting time. Formally, $M\ t = t = f\ t = g\ t = h\ t$. Let $P\ t$ mean that no time between *now* and t is acceptable. Formally, $P\ t = \neg\exists u\cdot\ now \le u < t \wedge M\ u$.

$M\ t' \wedge P\ t' \Leftarrow t := now.\ P\ t \Rightarrow M\ t' \wedge P\ t'$

$P\ t \Rightarrow M\ t' \wedge P\ t' \Leftarrow u := f(g(h\ t)).$ **if** $u = t$ **then** *ok* **else** $t := u.\ P\ t \Rightarrow M\ t' \wedge P\ t'$ **fi**

Let the three functions be f, g, and h. Let *now* be the current time. Let $M\ t\ t'$ mean that t' is the first acceptable meeting time from time t onwards. Formally,

$M\ t\ t' = t \le t' \wedge \neg(\exists u\cdot\ t \le u < t' \wedge u = f\ u = g\ u = h\ u) \wedge t' = f\ t' = g\ t' = h\ t'$

Then the problem is $M\ now$, and the solution is

$M\ now\ t' \Leftarrow t := now.\ M\ t\ t'$

$M\ t\ t' \Leftarrow u := f(g(ht)).$ **if** $u = t$ **then** *ok* **else** $t := u.\ M\ t\ t'$ **fi**