

- 160 You are given a predicate *prime* with domain *nat* such that $prime\ n$ is \top if n is a prime number, and \perp if it is not. You are given natural variable n . Write a program to assign to n the smallest prime number that is bigger than or equal to the initial value of n . Write all specifications and refinements necessary to prove your program is correct, but you do not need to write the proof. You may ignore time.

After trying the question, scroll down to the solution.

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Let

$$P = n' \geq n \wedge \text{prime } n' \wedge \neg \exists i: n..n'. \text{prime } i$$

Then

$$P \iff \text{if prime } n \text{ then ok else } n := n+1. P \text{ fi}$$