Systematic Program Design - Part 3

Problem Bank

s7oev •

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Language

For this multiple choice design quiz, download the starter and complete the problems.

Style Rules

Once you have finished, answer the multiple choice questions about your design.

Glossarv

Unlike the lecture questions, you will only have one attempt to answer each question in the quiz, so make sure to read each answer carefully before selecting one and pressing submit.

Question 1

1/1 point (graded)

Questions 1-3 deal with PROBLEM 1 in the starter file.

How many accumulators are necessary for the design of longest-length?

0 0

c 1

0 2

0 3



Explanation

We need an accumulator to keep track of the longest string so far.

Submit You have used 1 of 1 attempt



Answers are displayed within the problem

Question 2

0/1 point (graded)

The following are pairs of Type Comments and Invariants for accumulators.

Select all that are valid accumulators for ${\tt longest-length}$

 $\overline{\mathbf{v}}$;; acc is Natural; the length of the longest string so far in los \mathbf{v}

 \square ;; acc is Boolean; true if the current string is the longest so far in los

 $\hfill \square$;; acc is String; the first letter of the longest string so far in los

;; acc is String; the longest string so far in los \checkmark



Explanation

We need to know the length of the longest string in the list.

If the accumulator is Natural, and keeps track of the length of the longest string so far, we have exactly what we need.

If the accululator is String, and keeps track of the longest string so far, we can take the length at the end.

The other two options will not keep track of the necessary information.

Submit You have used 1 of 1 attempt



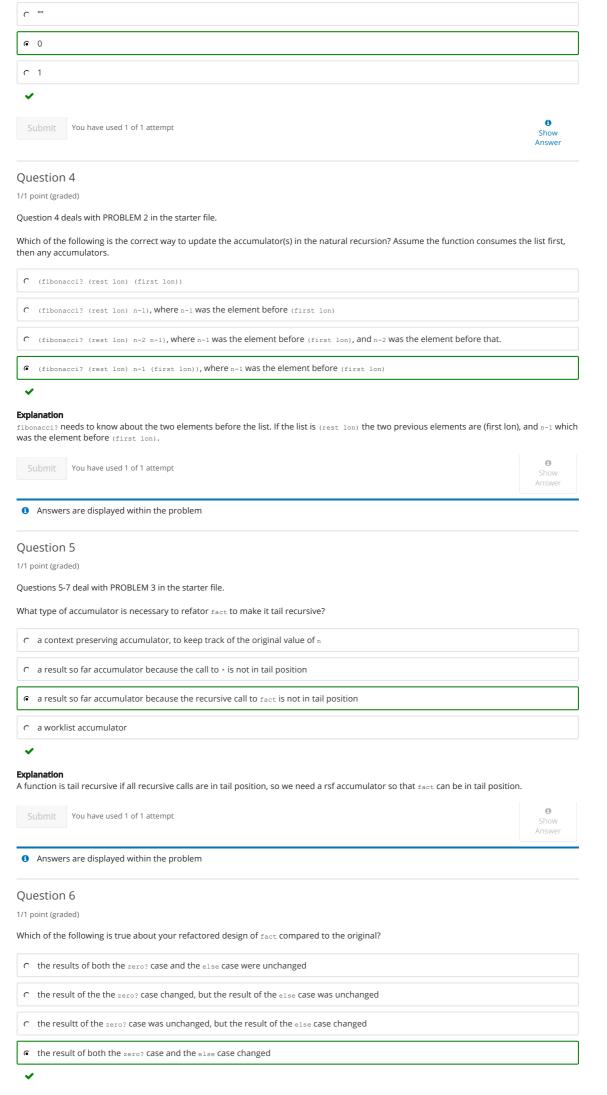
1 Answers are displayed within the problem

Question 3

1/1 point (graded)

If your accumulator is a Natural, representing the length of the longest string in the list, what should its initial value be?

c empty



Explanation

The resuts of both cond cases change in the refactoring of $_{\mathtt{fact}}$.

1 Answers are displayed within the problem

Question 7

1/1 point (graded)

Drag the pieces of code from the scroll bar to complete the refactored design of fact. You do not need to use every piece of code, and you can use each piece more than once.

```
(define (fact n)
(local [(define (fact n rsf
          (cond [(zero? n) rsf ]
                [else
                 (fact (sub1 n)(* n rsf))]))]
  (fact n 1 )))
```





Answer:

Submit You have used 1 of 1 attempt

✓ Correct (1/1 point)

Question 8

1/1 point (graded)

Questions 8-11 deal with PROBLEM 4 in the starter file.

In the encapsulated template for fn-for-region, which functions have elements that are not tail recursive, and will need to be refactored?

 fn-for-region ☐ fn-for-type fn-for-lor



Explanation

 ${\tt fn-for-type}$ has no recursive calls, so it has no elements that are not tail recursive. Both ${\tt fn-for-region}$ and ${\tt fn-for-lor}$ have recursive calls that are not in tail position.

Submit You have used 1 of 1 attempt



1 Answers are displayed within the problem

Question 9

1/1 point (graded)

Select the accumulators that are necessary in the tail-recursive design of ${\tt count-regions}$?

☑ ;; todo is (listof Region); a worklist accumulator

 $\ \square$;; todo is Region; a worklist accumulator

 \square ;; rsf is Region; the last region visited

 $oldsymbol{arphi}$;; rsf is Natural; the number of regions seen so far

☐ ;; visited is (listof Region); all regions seen so far

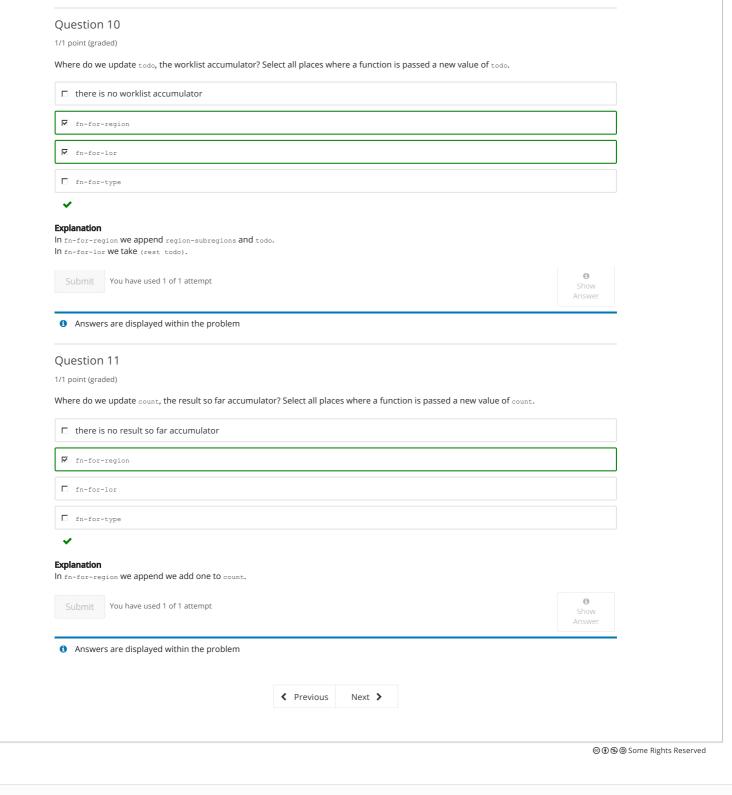


Explanation

To make this function tail recursive, we need a worklist accumulator that is a list fo the Regions we need to visit, and a result so far accumulator that is the number of regions seen so far.

Submit You have used 1 of 1 attempt

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