FUNCTIONAL PROGRAMMING 2017-2018 SPRING QUIZ 1

40 minutes   Mar 9, 2018

Id	Full Name	Signature	Q1	Q2a	Q2b	Q2c	Total
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1. What is a pure function? Why is it easier to test a pure function than to test the method of a class?

2. The Syracuse sequence is generated by starting with a natural number and repeatedly applying the following function until reaching 1:

$$syr(x) = \begin{cases} x/2 & if\ x\ is\ even \\ 3x+1 & if\ x\ is\ odd \end{cases}$$

For example, the Syracuse sequence starting with 5 is: $5, 16, 8, 4, 2, 1$.

Answer the following questions based on this problem. When writing functions, always include the type signature.

(a) Write the *syr* function described above. For example, *syr* 5 should return 16.

(b) Write a primitive recursive *syracuse* function that given a number, returns the Syracuse sequence starting from that number. For example, *syracuse* 5 should return [5, 16, 8, 4, 2, 1]. Explain why this function is not tail recursive.

(c) Write a tail recursive version of the *syracuse* function.