

CS450 Homework 5

Robert Steele

Part 1 - Question 2:

- a. Apply works by applying a procedure to a list of arguments. Essentially it unpacks the list and calls the procedure with all elements of the list as arguments. So, in this case...

`(apply stream-map (cons proc (map stream-cdr argstreams)))`

evaluates to...

`(stream-map proc (stream-cdr stream1) (stream-cdr stream2) etc...)`

Because...

`(cons proc (map stream-cdr argstreams))`

Evaluates to...

`(proc, (stream-cdr stream1), (stream-cdr stream2), etc...)`

Which is a list that apply can use as arguments for stream-map.

The reason we cannot leave out apply and cons here is because doing so would leave us with this...

`(stream-map proc (map proc argstreams))`

which evaluates to...

`(stream-map proc (list of streams))`

Stream map does not take a list of streams as an argument it takes multiple streams. And it is for that reason that we cannot remove apply and cons.

- b. This also works because apply can not only take a list of arguments but can also take multiple arguments so long as the last argument is a list. When given multiple arguments apply will expand the list and call the procedure with all the preceding arguments and the arguments from the list. For example,...

`(apply + 1 2 3 4 (list 5 6 7 8))`

Evaluates to...

`(+ 1 2 3 4 5 6 7 8)`

And likewise

`(apply stream-map proc (map stream-cdr argstreams))`

Evaluates to...

`(stream-map proc (stream-cdr stream1) (stream-cdr stream2) etc...)`

This is the same result we get when evaluating

(apply stream-map (cons proc (map stream-cdr argstreams)))

Part 2 – Question 1

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Part 2

Question 1:

	Output stream	a	a-list	pow	input stream
	(1	0	()	-	(987436917)
	(1	783	(783)	100	(87436917)
	(1	8526	(8526)	1000	(7436917)
	(8)	526	(526)	100	(7436917)
	(8)	5869	(5869)	1000	(436917)
consume $87+69 \geq 100$	(85)	869	(869)	100	(436917)
produce $87+38 \leq 1000$	prod. (85)	9038	(9038)	1000	(36917)
consume $87+38 \geq 100$	(859)	38	(9038)	100	(36917)
produce $87+641 < 1000$	(859)	641	(0641)	1000	(6917)
consume $87+641 \geq 100$	(8590)	641	(641)	100	(6917)
consume $87+932 \geq 1000$	(8590)	6932	(6932)	1000	(917)
produce $87+103 < 10000$	(8590)	70103	(70103)	10000	(177)
produce $87+103 < 1000$	(85907)	103	(0103)	1000	(17)
produce $87+3 < 100$	(859070)	103	(103)	100	(17)
consume $87+3 \geq 10$	(8590701)	3	(03)	10	(17)
consume $87+17 \geq 100$	(8590701)	117	(117)	100	(7)
stream is empty so append rest of a-list	(8590701)	1779	(1779)	1000	()
	(85907011779)				

output & 85907011779