IIT Madras

ONLINE DEGREE

Computational Thinking
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Tutorial on answering subpart pseudocode questions based on lists

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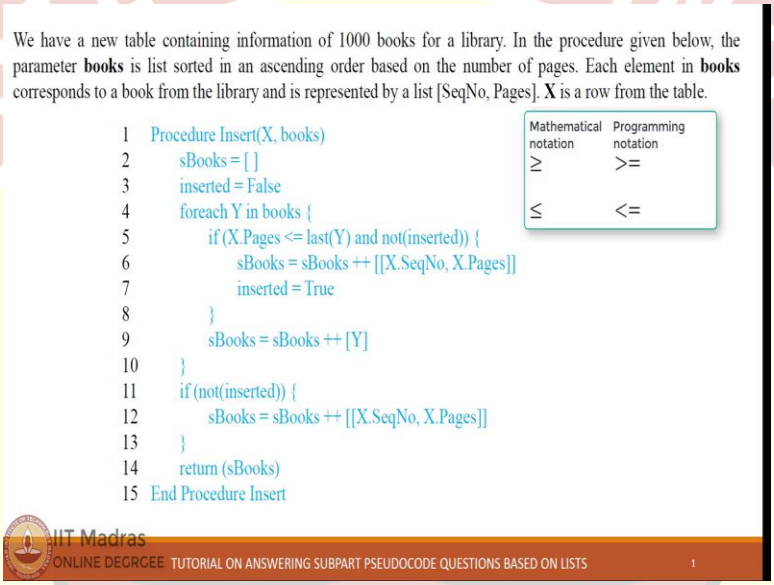

Hello Computational Thinking students. In this tutorial we will see how to solve subpart pseudocode questions based on lists. We will use this pseudocode as a reference to answer the subpart questions. Let us read the given statement and analyze the code. We have a new table containing information of 1000 books for a library. In the procedure given below the parameter books is list sorted in an ascending order based on the number of pages.

Each element in books corresponds to a book from the library and is represented by a list, sequence number comma pages. X is a row from the table. Here books is a list of lists or commonly referred as nested list where each element of the outer list is a list itself. The inner lists are consisting of two values; sequence number and number of pages of the book.

The given procedure accepts two parameters; x and books where books stores the information of all the books available in the library whereas x holds the details of a book whose details we are

trying to insert in the list books using this procedure. In line 2, we have initialized an empty list called sbooks which will be the updated version of the list books.

We are also maintaining a Boolean variable called inserted to keep track of whether the element x has been inserted in the list or not. Therefore, it is initialized to false. As we have studied earlier foreach block is like an iterator which will run over the list books element by element. The if condition is line 5 has two parts; connected using AND operator.

Second part makes sure that the new book x is not yet inserted in the list books. And the first part compares number of pages of the book x with every book in the list books. Here this new notation might be confusing but it is nothing but less than equal to, in programming languages we use these type of notations for greater than equal to and less than equal to operator. If both these conditions are satisfied, then only the line number 6 and 7 will be executed which means that this condition takes care of the correct location of element x in the list books.

Line 6 inserts the new book x in the list sbooks and line 7 sets the Boolean variable inserted to true. Line 9 copies all the existing elements of list books to sbooks. There is a probability that the variable inserted may not be updated at all under two scenarios; one, the number of pages of book x is greater than all entries in the list books. In such a case the condition x dot pages less than equal to last of y in line 5 will never become true.

And second, the list books is empty and for each block does not execute. Under these two situations we will execute line 12. And book x will be inserted into the list sbooks. Now let us solve some questions based on this Pseudocode.

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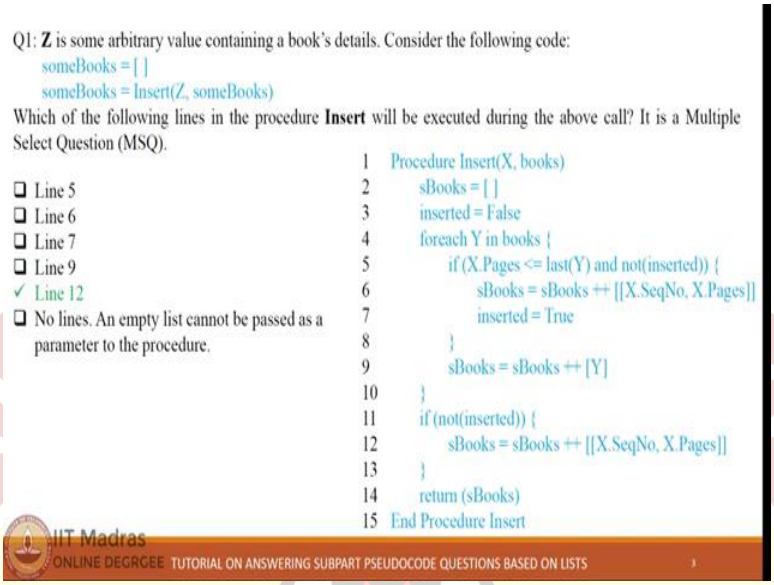

Question 1; Z is some arbitrary value containing a books details. Consider the following code, some books is equal to empty list, some books is equal to insert z, some books which of the following lines in the procedure insert will be executed during the above code. It is a multiple select question. Here we are executing the insert procedure using some arbitrary value z and variable some books which is an empty list.

As we have seen earlier if the second parameter of the insert procedure is empty then the foreach block will not execute. And therefore the variable insert will remain false. Hence the if condition in line 11 will be true and then the line 12 will execute.

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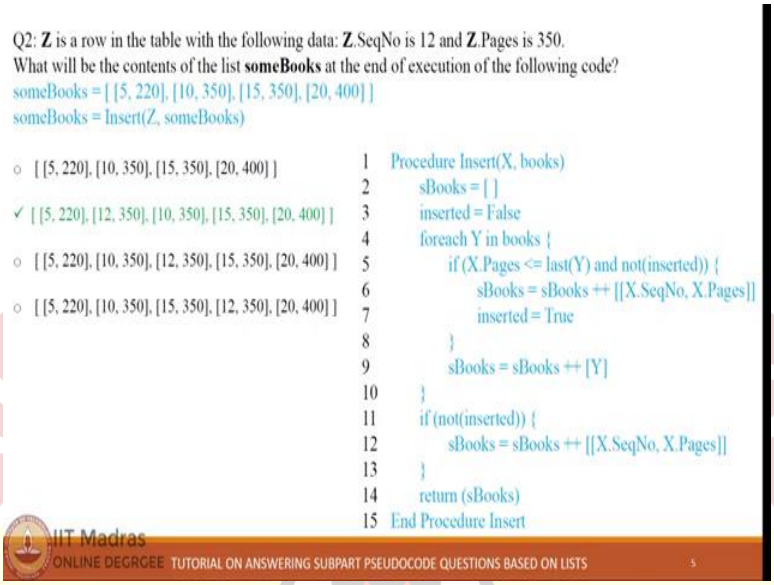

Question 2; z is a row in the table with the following data, z dot sequence number is 12 and z dot pages is 350. What will be the contents of the list some books at the end of execution of the following code? Some books is equal to the given list, some books is equal to insert z, some books. In this question we are trying to insert an entry 12, 350 in the existing list some books using the insert procedure seen earlier. As per the given pseudocode for each operator will iterate over the input list and number of pages which is 350 will be compared with every last of element in the list.

Whenever it comes across an element where this condition x dot pages less than equal to last of y is true it will insert the new element 12, 350. Hence the new element will be inserted at second location and the updated list will be 5, 220; 12, 350; 10, 350; 15, 350; 20, 400.

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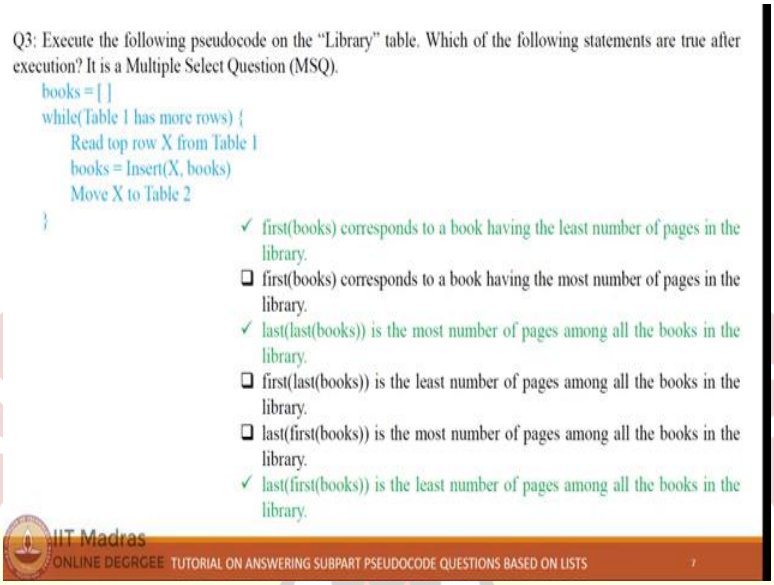

Question 3; execute the following pseudocode on the library table. Which of the following statements are true after execution? It is a multiple select question. Book is equal to empty list while table 1 has more rows, read top row x from table 1, books is equal to insert of x, books move x to table 2. In this pseudocode we are iterating over the library table which we have used earlier from our data sets. Insert procedure will execute for every row in table 1. It will pass one table row at a time and the list books to store these details. Initially the list books is empty and with every iteration of this pseudocode a new entry will be appended in the list books.

Finally, we will have the list books with details of all rows from library table in the ascending order of their page numbers. First of books will give us the first element from the list books. And as the list books is sorted in the ascending order the first element will correspond to the book with least number of pages. Last of last of books, here first we should execute the inner function and then the output of that will be provided to the outer function as an input.

Last of books refers to the last element in the list books. And last of that will return the number of pages of that book. Therefore it will correspond to the maximum number of pages in the library table. First of last of books, in this last of books refers to the last element in the list books and the first of that will return the sequence number of that book not the least number of pages.

Last of first of books; here first of books refers to the first element in the list books and the last of that will return the number of pages of that book. Therefore, it will correspond to the

minimum number of pages in the library table. This is the difference between first books and last of first books. One will give the details of the book with least number of pages whereas other will give the minimum number of pages in the table. Thank you for watching this tutorial, happy learning.