

سایت درس ساختمان داده‌ها		نام درس: ساختمان داده‌ها
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مهلت تحویل: ۳۱ اردیبهشت ۹۸	زمان تعریف: ۳۰ فروردین ۹۸	تکلیف شماره دوم

پاسخ سوالات را تا تاریخ مقرر تحویل دهید. پاسخ سوالات را به صورت دست‌نویس نوشته و در سرکلاس تحویل دهید.  
به ازای هر روز تاخیر در تحویل تکلیف ۳۰ درصد از نمره آن کسر می‌شود.

(برای حل سوال ۱ و ۲، بخش ۳-۵ از کتاب را مطالعه کنید. فایل کتاب در کانال تلگرامی درس بارگزاری شده است.)

- Two stacks are to be represented in an array  $M[1..m]$  as described in this section (Section 3-5, Page 137). Write algorithms  $add(i, x)$  and  $delete(i)$  to add  $x$  and delete an element from stack  $i, i = 1, 2$ . Your algorithms should be able to add elements to the stacks so long as there are fewer than  $m$  elements in both stacks together and should run in  $O(1)$  time.
- Design a data representation sequentially mapping  $n$  queues into an array  $M[1..m]$ . Represent each queue as a circular queue within  $M$ . Write procedures  $addq$ ,  $deleteq$ , and  $QueueFull$  for this representation.
- Write an algorithm length to count the number of nodes in a singly linked list  $p$ , where  $p$  points to the first node in the list. The last node has link field  $null$ . What is the time complexity of your algorithm?
- Let  $x = (x_1, x_2, \dots, x_n)$  and  $y = (y_1, y_2, \dots, y_m)$  be two linked lists. Write an algorithm to merge the two lists together to obtain the linked list  $z = (x_1, y_1, x_2, y_2, \dots, x_m, y_m, x_{m+1}, \dots, x_n)$  if  $m \leq n$  and  $z = (x_1, y_1, x_2, y_2, \dots, x_n, y_n, y_{n+1}, \dots, y_m)$  if  $m > n$ . Following the merge,  $x$  and  $y$  should not exist as individual lists because each node initially in  $x$  or  $y$  is now in  $z$ . No additional nodes may be used. What is the time complexity of your algorithm?
- Let  $p$  be a pointer to a circularly linked list. Show how this list may be used as a queue (i.e., write algorithms to add and delete elements). Specify the value for  $p$  when the queue is empty.