

CS205
Algorithm Lab
Assignment-1

Lab Assignment: a

Home Assignment: b,c

- a. Consider a set of n Electric Vehicles (EVs) having EV number from 1 to n . A set of EVs (a group) need to be parked in a line for its own charging port in a charging station. However there is an issue, if two EVs with consecutive EV number charging simultaneously then voltage drop occurred in charging station. Therefore a compatible group, no two EVs have consecutive EV numbers, is to be chosen. You need to determine in how many ways a compatible group can be chosen for the given n . You need to write a recursive function and the approach should be as follows. When you have chosen EV1, you may stop here and ends with only one element group or you may choose some EVs out of EV3-EV n . In another choice you may discard EV1 and choose groups from rest $n-1$ EVs. Determine the number of possible groups. For example when you have EV1, EV2, EV3, EV4, following are possible groups
EV1, EV2, EV3, EV4, EV1-EV3, EV1-EV4, EV2-EV4
So total 7 groups are possible

TEST CASE:

Enter a number

10

Number of ways a compatible project group can be chosen is: 143

Upload Ass1a.c

- b. John has a staircase in his house and he likes to climb staircase either 1 step or 2 steps or 3 steps at a time. Being a very curious child, he wonders how many ways there are to reach the top of the staircase. Given the respective height the staircases in his house, print all the paths that he can climb the staircase and total number of ways he can climb.

For example if total no of staircase is 2 then following should be printed

1,1

2

Total number of ways=2

If total no of staircase is 3 then following should be printed

1,1,1

1,2

2,1

3

Total number of ways=4

If total no of staircase is 4 then following should be printed

1,1,1,1

1,1,2

1,2,1

2,1,1

2,2

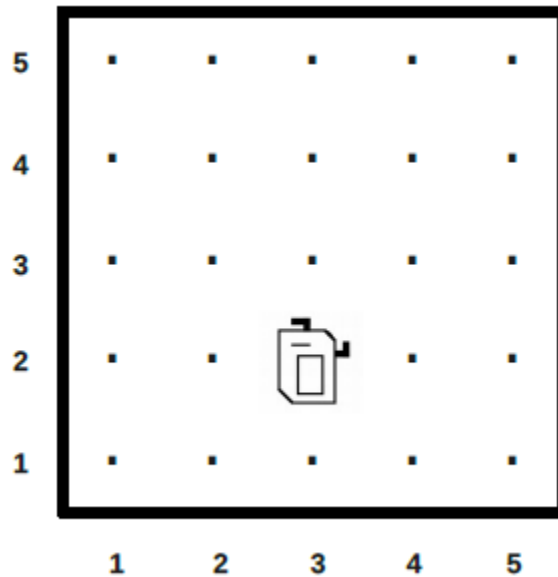
1,3

3,1

Total number of ways=7

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- c. As most of you know, Karel the Robot lives in a world composed of streets and avenues laid out in a regular rectangular grid that looks like this:



Suppose that Karel is sitting on the intersection of 2nd Street and 3rd Avenue as shown in the diagram and wants to get back to the origin at 1st Street and 1st Avenue. Even if Karel wants to avoid going out of the way, there are still several equally short paths. For example, in this diagram there are three possible routes, as follows:

- Move left, then left, then down.
- Move left, then down, then left.
- Move down, then left, then left.

Your job in this problem is to write a recursive function which would print all possible paths to return to position 1,1.

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