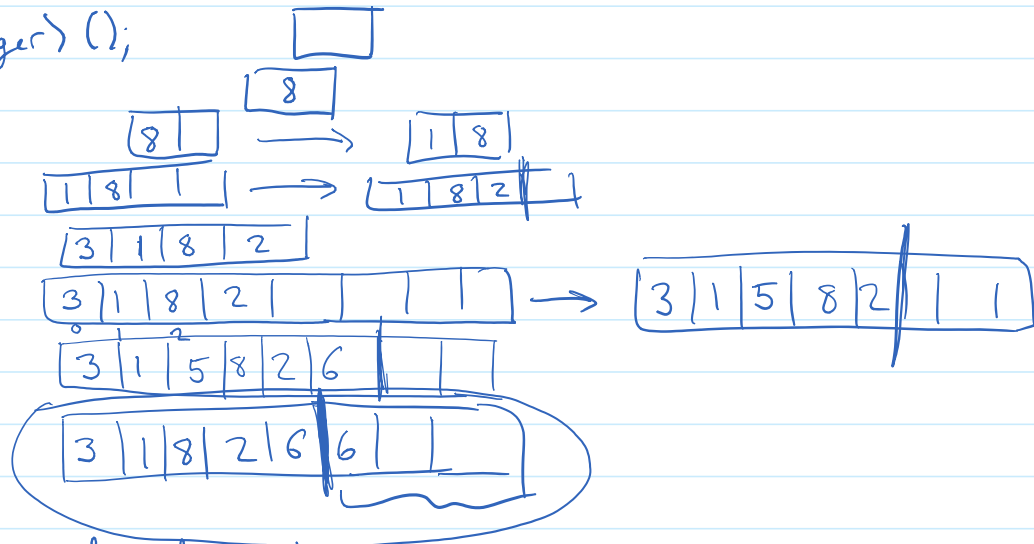


Quiz 01

```
arr = new ArrayList<Integer>();
arr.append(8)
arr.insert(0, 1)
arr.insert(2, 2)
arr.insert(0, 3)
arr.insert(2, 5)
arr.append(6)
arr.delete(2)
```

> ...



Given the above commands, draw the resulting ArrayList (show me both the extent of the list & the array)

assumptions:

ArrayLists always begin w/ an array of size 1

`delete(int index)`

`insert(int index, element)`

`append(element)`

factorial:

$$x! = \begin{cases} 1 & \text{if } x=0 \\ x \cdot (x-1)! & \text{otherwise} \end{cases}$$

$$\text{fact}(x) = \begin{cases} 1 & \text{if } x=0 \\ x \cdot \text{fact}(x-1) & \text{otherwise} \end{cases}$$

$$\text{fact}(x) = x \cdot \text{fact}(x-1)$$

$$\text{fact}(k) = k \cdot \text{fact}(k-1)$$

$$\text{fact}(k) = k \cdot \text{fact}(k-1)$$

$$\begin{aligned} C(k) &= k \cdot C(k-1) \\ C(0) &= 1 \end{aligned} \Rightarrow C(k) = \begin{cases} 1 & \text{if } k=0 \\ k \cdot C(k-1) & \text{otherwise} \end{cases}$$

```
public static int fact(int num) {
    if (num == 0) {
        return 1;
    }
    return num * fact(num-1);
}
```

$$D(k) = \begin{cases} \sum_{i=1}^k D(i-1) * D(k-i) & \text{if } k > 0 \\ 1 & \text{if } k = 0 \end{cases}$$

```
// D(k)
public static int reducedFact(int num) {
    if (num == 0) {
        return 1;
    }
    int total = 0;
    for (int i = 1; i <= num; i++) {
        total += reducedFact(i-1) * reducedFact(num-i);
    }
    return total;
}
```

`java.util.ArrayList`

`void insert(index, elem)`

$$\begin{pmatrix} 1_{00} & 2_{01} \\ 3 & 4 \end{pmatrix}$$

`int[][] arr = ...`
 int array array arr of arrays

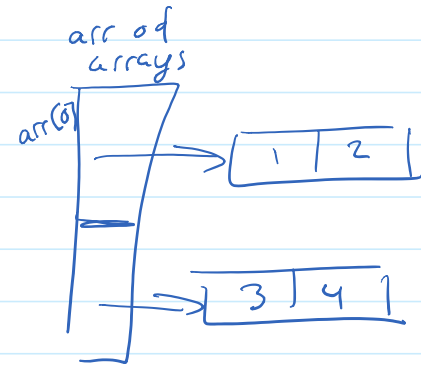
$$^6 \begin{pmatrix} 1_{00} & 2_{01} \\ 3_{10} & 4_{11} \end{pmatrix}$$

int[][] arr = ...
int array array

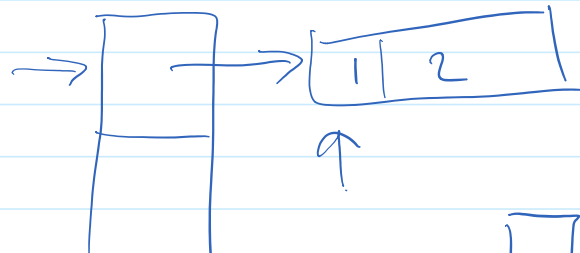
arr[0] → [1 | 2]

firstrow = arr[0]
firstrow[0]

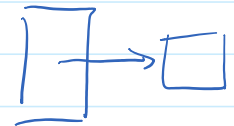
(arr[0])[0]



ArrayList<ArrayList<Integer>> list = new _____();
list



list.append(new ArrayList<Integer>());

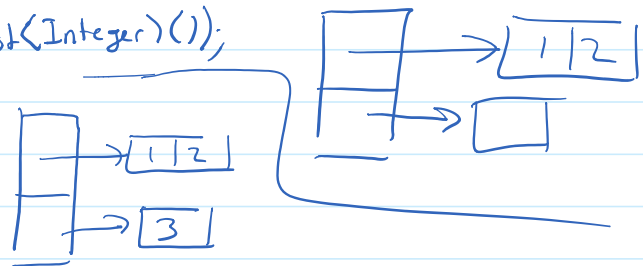


(list.get(0)).append(1); // [] → [1]
index element

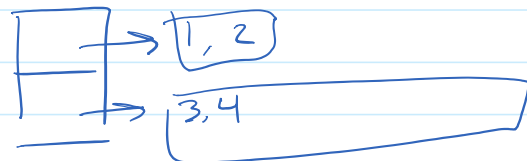
list.get(0).append(2) // [] → [1 | 2]

list.append(new ArrayList<Integer>());

list.get(1).append(3);



list.get(1).append(4);



~~arr[0] = ...~~
list.insert(...)

Reading in a file

```
java.util.Scanner scan = new Scanner(new File());
```

```
Scanner scan = null;
```

```
try {  
    scan = new Scanner(java.io.new File(...));  
} catch (FileNotFoundException e) {  
    ;  
}
```

```
}  
scan.nextLine() → first line in file
```