Set 10

1. Where is the isValid method specified? Which classes provide an implementation of this method?

在网格中指定了isValid方法。边界网格和无边界网格类实现了这个方法

2. Which AbstractGrid methods call the isValid method? Why don’t the other methods need to call it?

Method getValidAdjacentLocations 调用isValid()

1. Which methods of the Grid interface are called in the getNeighbors method? Which classes provide implementations o f these methods?

Method 调用 get 和 getOccupiedAdjacentLocations.

The AbstractGrid class implements the getOccupiedAdjacentLocations method.

The getmethod is implemented in the BoundedGrid and UnboundedGrid classes.

4. Why must the get method, which returns an object of type E, be used in the

getEmptyAdjacentLocations method when this method returns locations, not objects of type E?

get方法返回对存储在给定位置的对象的引用，如果不存在对象，则返回null。调用get方法获取临近位置。如果返回null，则该位置为“空”，并被添加到列表中

5. What would be the effect of replacing the constant Location.HALF\_RIGHT with Location.RIGHT in the two places where it occurs in the getValidAdjacentLocations method?

临近的位置方向会从八个方向变成四个方向.

Set 11

1. What ensures that a grid has at least one valid location?

如果超出范围会报 IllegalArgumentException

1. How is the number of columns in the grid determined by the getNumCols method? What assumption about the grid makes this possible?

occupantArray[0].length

getNumCols返回使用者数组的第0行中的列数。构造函数确保每个边界对象至少有一行和一列。

1. What are the requirements for a Location to be valid in a BoundedGrid?

一个位置的行值必须大于或等于0，且必须小于边界网格中的行数。一个位置的列值必须大于或等于0，且必须小于边界网格中的列数。

1. What type is returned by the getOccupiedLocations method? What is the time complexity (Big-Oh)

ArrayList<Location>

O(r \* c)

1. What type is returned by the get method? What parameter is needed? What is the time complexity (Big-Oh) for this method?

为get方法返回的类型是E，它是存储在使用者数组中的任何类型。get方法需要一个位置对象。访问给定的二维阵列，行和列值为O (1)

1. What conditions may cause an exception to be thrown by the put method? What is the time complexity (BigOh) for this method?

如果发送到put方法的对象为null，则将抛出一个异常。put方法的时间复杂度为O (1)

E实际存储在Bounded网格对象中的任何类型。如果试图从空位置删除，则将在该位置 中存储null，并返回null。移除方法的时间复杂度为O (1)。

1. Based on the answers to questions 4, 5, 6, and 7, would you consider this an efficient implementation?

可以使用hashmap存储网格上的对象

Set 12

1. Which method must the Location class implement so that an instance of HashMap can be used for the map? What would be required of the Location calss if a TreeMap were used instead? Does Location satisfy these requirements?

代码实现：

//equals()函数与hashCode函数()

// @file: GridWorldCode\framework\info\gridworld\grid\Location.java

// @line: 218-221 , 205-212 , 234-246

public int hashCode()

{

return getRow() \* 3737 + getCol();

}

public boolean equals(Object other)

{

if (!(other instanceof Location))

return false;

Location otherLoc = (Location) other;

return getRow() == otherLoc.getRow() && getCol() == otherLoc.getCol();

}

public int compareTo(Object other)

{

Location otherLoc = (Location) other;

if (getRow() < otherLoc.getRow())

return -1;

if (getRow() > otherLoc.getRow())

return 1;

if (getCol() < otherLoc.getCol())

return -1;

if (getCol() > otherLoc.getCol())

return 1;

return 0;

}

1. Why are the checks for null included in the get, put, and remove methods? Why are no such checks included in the corresponding methods for the BoundedGrid?

答：由于UnboundedGrid对象实例是无界的，所以所有的位置均为有效位置，所以

isValid（）函数无法发挥作用来判断应该位置是否出界；而get、put、remove方法函数首先需要判断位置是否有效，这在UnboundedGrid对象实例中是不必要的行为，所以这几个方法也没有加入到UnboudedGrid类中；而BoundedGrid对象实例与上面提到的不太一样，这个对象实体是有界的，也就需要我们先去判断位置是否出界，所以在BoundedGrid类中，这几个方法仍然可以使用。

代码实现：

//UnboundedGrid类中isValid()函数

// @file: GridWorldCode\framework\info\gridworld\grid\UnboundedGrid.java

// @line: 53 - 56

public boolean isValid(Location loc)

{

return true;

}

1. What is the average time complexity (Big-Oh) for the three methods: get, put, or remove? What would it be if a TreeMap were used instead of a HashMap?

答：平均时间复杂度为O（1）；如果使用HashMap，时间复杂度将会变为O（log n）。

1. How would the behavior of this class differ,aside from time complexity, if a TreeMap were used instead of a HashMap?

答：访问实例对象的方法也会发生变化。在HashMap方法中，直接通过下标访问对象实例，而在TreeMap中则需要通过树的遍历进行匹配，进而完成对实体对象的访问。

1. Could a map implementation be used for a bounded grid? What advantage, if any, would the rwo-dimensional array implementation that is used by the BoundedGrid class hava over a map implementation?

答：可以被用于BoundedGrid；当一个Grid存满的时候，如果只使用Array而不使用ArrayList的话，可以免除对实体对象坐标的存储，可以节省一大部分的内存开销。