SUMMARY
In this assignment you will write a program to play the game Connect Four.

DEADLINE
This assignment is due on Wednesday, Nov 13 at 11:00 pm.

DESCRIPTION
Connect four is a popular game played by dropping checkers into a vertical grid with six rows and seven columns. The checkers can be dropped in any of the seven columns (permitted they are not full). Once dropped, the checker falls to the lowest unoccupied space. The winner is the first player to occupy four consecutive spaces in a straight line, either horizontal, vertical, or diagonal.

SPECIFICATIONS
In this project you will write a program to play Connect Four using a two-dimensional array of integers to represent the grid and a Picture object to display the game. You will create a class called ConnectFour to represent the game. The class PlayConnectFour (provided) will allow the user to play the game. When run, this program will display the game board and ask the user to specify a column. The user is always player 1 (red checkers) and goes first. After the user enters a column the opponent will select a column for their piece.

For this project you will create a simple naive opponent that selects a column at random. Then the program will update and repaint the board and ask the user to select another column. This will repeat until the game ends in a win, loss, or draw.

To help with this project a Referee class is provided. The referee will look at your grid and tell you whether the game is a win, loss, draw, or is not finished.
Are you here now?

A. Yes
B. No
C. Maybe
D. No
E. Definitely Not

JAVA.UTIL.ARRAYLIST

- An ArrayList object is an array that can grow or shrink as needed.
  - For instance, we usually don’t know the number of students that will be in a course.
    - If we create an array for more than we have, we waste space.
    - If we try to add a student past the end of the array, we get an exception.
- Use an ArrayList when you don’t know how many of something you need.

ARRAYLIST METHODS

- Look in the Java API for ArrayList
  - Open the package java.util
  - Click on the class ArrayList
- Or look in the book on pp. 399-400
ARRAYLIST METHODS

• What method(s):
  – lets you add an object to the ArrayList?
    
    ```java
    add(Object o)
    add(int index, Object o)
    ```
  – lets you get an object from the ArrayList?
    ```java
    get(int index)
    ```
  – tells you how many things are in the ArrayList?
    ```java
    size()
    ```
  – lets you remove an object from an index in the ArrayList?
    ```java
    remove(int index)
    ```

AN ARRAYLIST IS A LIST

• Look at the API for ArrayList

COLLECTIONS STORE OBJECTS

• Why do we need to cast the Student object back to Student when we pull it back out of a list?
  – A list is a collection of (any type of) objects.
    • We need to put it back into a Student object.

ARRAYLIST EXERCISE

• In the ClassPeriod class,
  – Modify the `studentArray` to be a `studentList`
    ```java
    List studentList = new ArrayList();
    ```
  • Change all the methods that use an array to use an array list.
    – Cast back to Student when you pull the object out of the list
      ```java
      public Student getStudent(int index)
      {
        return (Student) this.studentList.get(index);
      }
      ```
• Casting from Object to Student is also called **downcasting**.
• Going from Student to Object is called **upcasting** and doesn’t require any casting.
• In other words, we need a cast when we need the more specific type.