

AP Computer Science A Review Test 2

1. (B6) Assume that `p`, `q`, and `r` are boolean variables. Consider the following expression.

`!((p && !q) || r)`

Which of the following expressions is equivalent to the given expression?

- A. `(p && r) || (!q && r)`
- B. `(!p && !q) || (!p && r)`
- C. `(!p || q) && !r`
- D. `(!p && q) || !r`
- B. `(p && !q) || r`

2. (DS2) For a certain application, objects have two methods. One method returns a `String`, `name`, and the other method returns an integer value, `score`, both to be stored in a data structure. The following operations will be performed on the data structure:

1. the data structure will be created with a set of 1000 objects that is never changed later
2. looking up an object by `name` and changing its `score`, which is done frequently
3. printing the list of names and scores in order of `score` from highest to lowest, which is done rarely, only after operation 2 has been done several thousand times

Which of the following data structures would be the most appropriate for this task?

- A. An unordered array (objects are in the array in the order entered, unordered by `name` or `score`)
- B. An array ordered by `name`
- C. An array ordered by `score`
- D. An unordered `ArrayList` (objects are in the `ArrayList` in the order entered, unordered by `name` or `score`)
- E. An `ArrayList` ordered by `score`

AP Computer Science A Review Test 2

3. (A2) Consider the following declaration

```
public interface Landmark
{
    // returns the distance from home
    double distanceFromHome()
}
```

Assume the following data field and method are declared in another class.

```
private Landmark[] map;

public Landmark getIt()
{
    int index = 0;

    for(int k = 1; k < map.length; k++)
    {
        if(map[k].distanceFromHome() > map[index].distanceFromHome())
            index = k;
    }
    return map[index];
}
```

Which of the following best describes what is returned from a call to `getIt`?

- A. The item in `map` with the smallest distance from home.
- B. The index of the item in `map` with the smallest distance from home.
- C. The item in `map` with the greatest distance from home.
- D. The index of the item in `map` with the greatest distance from home.
- E. The first item in `map`

4. (C7) Which of the following statements about an interface is true?

- A. An interface can only have a default (no parameter) constructor.
- B. An interface can only have instance variables that are private.
- C. An interface can only have instance variables that are public.
- D. An interface can only have methods that are private.
- E. An interface can only have methods that are public.

AP Computer Science A Review Test 2

5. (B2) A boolean method `areDifferent` takes two parameters that are type `double` and is intended to return `true` if the absolute difference between the parameters is greater than a given threshold, `LIMIT`, that has been defined as a constant in the class containing this method. The method is shown in part below.

```
// postcondition: return true if the absolute difference between val1 and val2 is
//                greater than LIMIT; otherwise return false
public boolean areDifferent(double val1, double val2)
{
    double difference = val1 - val2;
    // code not shown
}
```

Consider the following replacements for `// missing code`.

- I. `return difference > LIMIT;`
- II. `if(-LIMIT <= difference && difference <= LIMIT)`
 `return false;`
 `else`
 `return true;`
- III. `if(difference < -LIMIT)`
 `return true;`
 `else if(difference > LIMIT)`
 `return true;`
 `else`
 `return false;`

Which of these replacements for `// missing code` would make `areDifferent` work as intended?

- A. I only
- B. II only
- C. III only
- D. II and III only
- E. I, II, and III

6. (R2) Consider the following method

```
public int change(int value)
{
    if(value < 3)
        return value % 3;
    else
        return value % 3 + 10 * change(value/3);
}
```

What will be returned by the call `change(45)`?

- A. 0
- B. 21
- C. 150
- D. 500
- E. 1200

AP Computer Science A Review Test 2

7. (C2) Consider the following description

An estate has a house and has a garden. A garden has flowers. A crocus is a flower and a daffodil is a flower.

Which of the following partial declarations would be the best choice for representing the relationships among these things?

- A.

```
public class House
{
    public class Garden
    {
        private ArrayList<Flower> myFlowers;
        . . .
    }

    public class Estate
    {
        private House myHouse;
        private Garden myGarden;
        . . .
    }

    public class Flower
    {
        public class Crocus extends Flower
        {
        }
        public class Daffodil extends Flower
        {
        }
    }
}
```
- B.

```
public class House
{
    public class Garden
    {
        private ArrayList<Flower> myFlowers;
        . . .
    }

    public class Estate extends House
    {
        private Garden myGarden;
        . . .
    }

    public class Flower
    {
        public class Crocus extends Flower
        {
        }
        public class Daffodil extends Flower
        {
        }
    }
}
```
- C.

```
public class House
{
    public class Garden
    {
        private ArrayList<Flower> myFlowers;
        . . .
    }

    public class Estate extends House
    {
        private Garden myGarden;
        . . .
    }

    public class Flower
    {
        private boolean isCrocus;
        private boolean isDaffodil;
    }
}
```
- D.

```
public class House
{
    public class Garden
    {
        private ArrayList<Flower> myFlowers;
        . . .
    }

    public class Estate
    {
        private House myHouse;
        private Garden myGarden;
        . . .
    }

    public class Flower
    {
        private boolean isCrocus;
        private boolean isDaffodil;
    }
}
```
- E.

```
public class House
{
    public class Garden
    {
        private ArrayList<Flower> myFlowers;
        . . .
    }

    public class Estate
    {
        private House myHouse;
        private Garden myGarden;
        . . .
    }

    public class Flower
    {
        private Garden myGarden;
    }

    public class Crocus extends Flower
    {
    }
    public class Daffodil extends Flower
    {
    }
}
```

AP Computer Science A Review Test 2

8. (SL2) Consider the following declarations.

```
public class Widget
{
    private String[] names;

    public Widget()
    { /* code not shown */ }

    public String[] nameList()
    { return names; }
}
```

Assume that the instance variable `names` is correctly initialized with ten elements by the constructor for `Widget`. Assume the following declaration is made in a client class.

```
Widget thing = new Widget();
```

Which of the following can be used in that client class to access the second element in the array `names` for `thing`?

- A. `thing.nameList(1);`
- B. `thing.nameList()[1];`
- C. `nameList[1].thing;`
- D. `thing.names[1];`
- E. `thing(names[1]);`

9. (C5) Assume that the following partial declarations have been made, with default constructors for the classes.

```
public interface Controller

public class Widget implements Controller

public class Thingy extends Widget
```

Consider the following declarations.

- I. `Widget myThing = new Thingy();`
- II. `Controller myWidge = new Thingy();`
- III. `Controller myControl = new Controller();`

Which of these declarations will compile correctly?

- A. I only
- B. II only
- C. III only
- D. I and II
- E. II and III

AP Computer Science A Review Test 2

10 (SL4) Consider the following partial class declaration.

```
public class Student
{
    private String myName;
    private double myGPA;

    public String name()
    { return myName; }

    public double GPA()
    { return myGPA; }
}
```

Consider the following method from a client class.

```
public void showInfo(Student stu)
{
    System.out.println( /* string expression */ );
}
```

Consider the following replacements for `/* string expression */`.

- I. `stu.myName + stu.myGPA;`
- II. `Student.name() + Student.GPA();`
- III. `stu.name() + stu.GPA();`

Which of these replacements will make the method `showInfo` work as intended?

- A. I only
- B. III only
- C. I and II only
- D. II and III only
- E. I, II, and III

11. (CTA2) Consider the following code segment.

```
int k = 5;
while(k >= 0 && k % 2 == 1)
{
    System.out.print(k);
    k = 2*k - 5;
}
```

What is printed as a result of executing this code segment?

- A. 5
- B. 5 1
- C. 5 3
- D. 5 3 1
- E. An unending sequence of 5's is printed since the loop never exits

AP Computer Science A Review Test 2

12. (C4) Consider the following partial declarations.

```
public class Location
{
    public Location(int xCoord, int yCoord)
        . . .
}
public class Color
{
    public Color(int redVal, int greenVal, int blueVal)
        . . .
}
public class Widget
{
    private Location myLoc;

    public Widget(int x, int y)
    {
        myLoc = new Location(x, y);
    }
    . . .
}
public class Thingy extends Widget
{
    private Color myColor;

    public Thingy(int x, int y, Color col)
    {
        super(x, y);
        myColor = col;
    }
    . . .
}
```

Assume that the following statement appears in a client program.

```
Widget widg = new Thingy(100, 100, new Color(100, 100, 100));
```

Which of the following best describes the order in which the constructors will begin execution?

- A. Color, Location, Widget, Thingy
- B. Widget, Thingy, Location, Color
- C. Color, Widget, Thingy, Location
- D. Thingy, Color, Widget, Location
- E. Color, Thingy, Widget, Location

13 (C13). Which of the following is the best reason to define an interface with several classes that implement it?

- A. Each of the classes implementing the interface shares a set of instance variables defined within the interface.
- B. Each of the classes implementing the interface can have part of its initialization involving common elements done by a constructor defined in the interface.
- C. Each of the classes implementing the interface has all the methods specified in the interface and can therefore be passed as an actual parameter to a method calling for the interface type as parameter.
- D. Each of the classes implementing the interface has only those methods specified by the interface and can therefore be stored in an array of elements of the interface type.
- E. Each of the classes implementing the interface can be used interchangeably for assignment to any variable with type specified as any of the other classes implementing the interface.

AP Computer Science A Review Test 2

14. (B7) Assume that `width` and `height` are variables of type `int`. Consider the following code segment.

```
width = <some positive value>;
height = <some value greater than width>;

while((width > 0) && (height / width > 5))
{
    height -= width;
    width -= 2;
}
```

Which of the following statements must be true when the loop exits?

- A. `(width > 0) && (height / width > 5)`
- B. `(width == 0) && (height / width > 5)`
- C. `(width <= 0) && (height / width <= 5)`
- D. `(width == 0) || (height / width <= 5)`
- E. `(width <= 0) || (height / width <= 5)`

15. (R4) Consider the following method

```
public int getSomething(int value)
{
    if(value < 1)
        return 0;
    else
        return 1 + getSomething(value - 1) + getSomething(value - 2);
}
```

What is returned by the call `getSomething(4)`?

- A. 0
- B. 1
- C. 2
- D. 5
- E. 7

16. (SL6) Consider the following declarations.

- I. `Double item = new Comparable(5.0);`
- II. `Comparable item = new Double(5.0);`
- III. `Comparable item = new Comparable(5.0);`

Which of these declarations is valid?

- A. I only
- B. II only
- C. III only
- D. I and II
- E. II and III

AP Computer Science A Review Test 2

17. (B4) A guidebook places hotel prices into four categories: category 1 (\$) means the price is \$50 or below; category 2 (\$\$) means the price is greater than \$50 but less than or equal \$80; category 3 (\$\$\$) means the price is greater than \$80 but less than or equal \$120; category 4 (\$\$\$\$) means the price is greater than \$120. The method `priceCategory` is intended to return a string with the number of '\$'s for the category of the parameter `price`.

```
public String priceCategory(double price)
{
    // missing code
}
```

Consider the following replacements for `// missing code`.

- I. String symbol;
 if(price <= 50.00)
 symbol = "\$";
 else if(price <= 80.00)
 symbol = "\$\$";
 else if(price <= 120.00)
 symbol = "\$\$\$";
 else
 symbol = "\$\$\$\$";
 return symbol;
- II. String symbol;
 if(price <= 50.00)
 symbol = "\$";
 else if(50.00 < price <= 80.00)
 symbol = "\$\$";
 else if(80.00 < price <= 120.00)
 symbol = "\$\$\$";
 else
 symbol = "\$\$\$\$";
 return symbol;
- III. if(price <= 50.00)
 return "\$";
 if(price <= 80.00)
 return "\$\$";
 if(price <= 120.00)
 return "\$\$\$";
 return "\$\$\$\$";

Which of these replacements for `// missing code` would make `priceCategory` work as intended?

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II, and III

AP Computer Science A Review Test 2

18. (CTA12) Consider the following code segment.

```
int value = 7;

for(int modulus = 6; value % modulus != 0 && modulus != 0; modulus = modulus - 2)
{
    value += 3;
}
System.out.println( value+ " " + modulus);
```

What is printed when this code is executed?

- A. 16 0
- B. 13 2
- C. 10 4
- D. 7 6
- E. Nothing is printed because a division-by-zero will generate an `ArithmeticException`

19. (SL9) Consider the following partial class declarations.

```
public class Account
{
    public double monthlyInterest()
    { /* code segment 1 not shown */ }

    // constructors, instance variables, and other methods not shown
}

public class CheckingAccount extends Account
{
    public double monthlyInterest()
    { /* code segment 2 not shown */ }

    // constructors, instance variables, and other methods not shown
}
```

The following code appears in a method in another class.

```
Account acct = new Account();

System.out.println(acct.monthlyInterest());
```

Which of the following is true?

- A. The call to `acct.monthlyInterest()` will first execute code segment 1 followed by code segment 2.
- B. The call to `acct.monthlyInterest()` will first execute code segment 2 followed by code segment 1.
- C. The call to `acct.monthlyInterest()` will execute code segment 1.
- D. The call to `acct.monthlyInterest()` will execute code segment 2.
- E. The call to `acct.monthlyInterest()` will cause a run-time error due to the ambiguity about which code segment should be executed, code segment 1 or code segment 2

AP Computer Science A Review Test 2

20. (SL8) Consider the following partial class declarations.

```
public class Point3D
{
    public double distanceTo(Point3D otherPt)
    {
        // computes the distance from this point to otherPt
    }

    // constructor, instance variables and other methods not shown
}

public class Sphere
{
    private Point3D center;
    private double radius;

    public boolean isInside(Point3D point)
    {
        return /* expression */;
    }

    // constructor, instance variables and other methods not shown
}
```

The method `isInside` is intended to return `true` if the distance from the center of the sphere to point is less than radius; otherwise it returns `false`.

Consider the following choices for expression.

- I. `distanceTo(center, point) < radius`
- II. `center.distanceTo(point) < radius`
- III. `point.distanceTo(center) < radius`

Which of these choices when substituted for `/* expression */`, will make `isInside` work as intended?

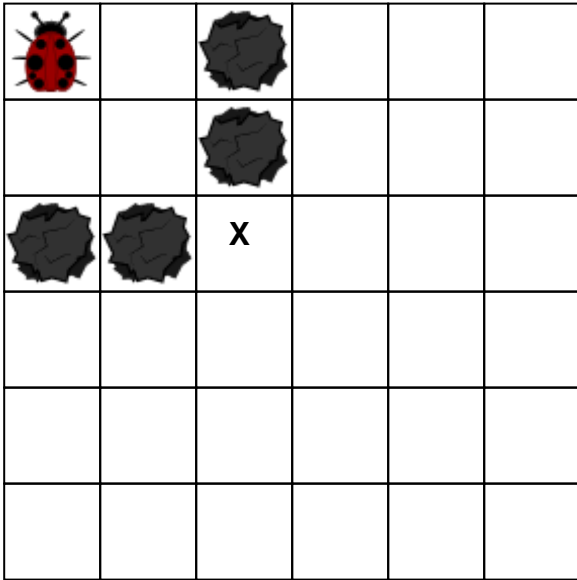
- A. I only
- B. II only
- C. III only
- D. II and III only
- E. I, II, and III

AP Computer Science A Review Test 2

Questions 21-25 refer to code from the Marine Biology Simulation. A copy of the code is supplied in the appendix.

21 (GW2).

Suppose the grid has the following initial configuration.



How many times would you need to click the step button to let the bug "escape" the rock trap by moving to the cell indicated by **X** (not an object in the grid)?

- A. 3
- B. 5
- C. 8
- D. 14
- E. The bug will never move out of the four corner locations

22 (GW4).

Consider the following circumstances for a bug.

- I. The bug has a flower directly in front of it.
- II. The bug has a rock directly in front of it.
- III. The bug has a wall (grid boundary) directly in front of it.

In which of these situations will the bug's `canMove()` method return `false`?

- A. II only
- B. III only
- C. I and II only
- D. II and III only
- E. I, II, and III

AP Computer Science A Review Test 2

23 (GW6).

Consider the class `MysteryBug` that extends `Bug`. The code for `MysteryBug` is exactly the same as the code for `BoxBug` except that the following lines of code are placed at the beginning of the `act` method (the remainder of the `act` method is identical to `BoxBug`):

```
if(steps == sideLength)
    sideLength--;
```

Which of the following best describes the behavior of a `MysteryBug` when the run button is clicked?

- A. It forms a rectangle.
- B. It forms a square
- C. It forms a spiral with increasing sides; when the sides can no longer grow, it moves along the boundary of the grid.
- D. It forms a spiral with smaller and smaller sides, when the side length reaches zero, then it forms a spiral with longer and longer sides.
- E. It forms a spiral with smaller and smaller sides. When the side length reaches zero it does not move and turns in place.

24 (GW8).

Assume the following statements have been executed.

```
Location loc1 = new Location(3,5);
Location loc2 = new Location(2,4);
```

Consider the expression

```
(dir == loc2.getDirectionToward(loc1))
```

Which of the following replacements for `dir` will make this expression true?

- A. `Location.NORTHWEST`
- B. `Direction.NORTHWEST`
- C. `Location.SOUTHEAST`
- D. `Direction.SOUTHEAST`
- E. No replacement will make the expression true because directions should be compared using `".equals(...)"` rather than `"=="`

AP Computer Science A Review Test 2

25 (GW10).

Suppose the statement in the `Critter processActors` method

```
a.removeSelfFromGrid();
```

is replaced by the statement

```
getGrid().remove(a.getLocation());
```

What would be the effect of this change when an instance of `Bug` is asked to act in the simulation after it has been processed by an instance of `Critter`?

- A. There would be no difference in behavior from the original; the two statements have the same result.
- B. The code will not compile because the `Grid remove` method takes an `Actor` as a parameter, not a `Location`.
- C. It will move to a new location in the grid and will still appear in the grid.
- D. An `Exception` will be thrown by the `moveTo` method.
- E. A `NullPointerException` will be thrown when its location is accessed.

26. (R6) Consider the following data field and method.

```
private int[] list;

public int getIt(int index)
{
    if(index == list.length - 1)
        return list[index];
    else
    {
        int target = getIt(index + 1);
        if(target < list[index])
            return target;
        else
            return list[index];
    }
}
```

What will be returned by the call `getIt(0)`?

- A. The smallest value in `list`
- B. The index of the smallest value in `list`
- C. The largest value in `list`
- D. The index of the largest value in `list`
- E. The index of the first occurrence of target in `list`

AP Computer Science A Review Test 2

27. (CTA7) Assume that the method `String promptString(String prompt)` gives the user a prompt message to enter a string at the keyboard and then returns the String entered by the user.

Consider the following method `getNames` which is intended to read names entered by the user and add them to an `ArrayList<String>` until the word "quit", not to be included in the list, is entered. The method `getNames` does not work as intended.

```
public ArrayList<String> getNames()
{
    ArrayList<String> list = new ArrayList<String>();
    String name = "";
    while(!name.equals("quit"))
    {
        name = promptString("Enter next name ");
        list.add(name);
    }
    return list;
}
```

Which of the following best describes the error in this method?

- A. The first entry in the list returned will be an empty string.
- B. The last entry in the list returned will be "quit".
- C. The variable `list` is not correctly declared and initialized.
- D. The variable `name` is not correctly declared and initialized.
- E. The loop may never exit because the loop condition is incorrect.

AP Computer Science A Review Test 2

28. (DS6) A program for a card game involves the use of 52 playing cards, to be represented by a class `PlayingCard`. The class `PlayingCard` will be immutable, so that the attributes of a card cannot be changed once it has been created. The class `PlayingCard` has two public methods. One method will be `suit`, which returns a `String` representing one of the four suits, "clubs", "diamonds", "hearts", "spades". The other method, `value`, will return an integer in the range 1 to 13 representing the value of the card (with 11 equivalent to a Jack, 12 to a Queen, and 13 to a King).

Consider the following designs for the `PlayingCard` class.

- I. Each `PlayingCard` has two instance variables, one a `String` with the value "clubs", "diamonds", "hearts", or "spades" and the other an integer in the range 1 to 13. The method `suit` returns a reference to the `String` instance variable and the method `value` returns the integer instance variable.
- II. Each `PlayingCard` has a single integer instance variable, `cardNum`, in the range 0 to 51, initialized by the constructor. The method `suit` computes `cardNum / 13` and returns "clubs" if the result is 0, "diamonds" if the result is 1, "hearts" if the result is 2, and "spades" if the result is 3. The method `value` returns `cardNum % 13 + 1`.
- III. Each `PlayingCard` has a single integer instance variable, `cardNum`, in the range 0 to 51, initialized by the constructor. The method `suit` computes `cardNum % 4` and returns "clubs" if the result is 0, "diamonds" if the result is 1, "hearts" if the result is 2, and "spades" if the result is 3. The method `value` returns `cardNum / 4 + 1`.

Which of these designs will satisfy the specification for `PlayingCard` given above?

- A. I only
- B. II only
- C. I and II only
- D. II and III only
- E. I, II, and III

29. (CTA11) Consider the following code segment.

```
int value = 13;
int modulus = 5;

while(value % modulus != 0 && modulus != 0)
{
    value += 3;
    modulus -= 1;
}
```

What are the values of `value` and `modulus` when the loop completes execution?

- A. `value = 28, modulus = 0`
- B. `value = 22, modulus = 2`
- C. `value = 16, modulus = 4`
- D. `value = 13, modulus = 5`
- E. The loop never exits because a division-by-zero will generate an `ArithmeticException`

AP Computer Science A Review Test 2

30. (C9) Consider the following declarations, where some lines have been numbered for reference.

```
public interface Controller
{
1   void doIt();
}

public class Widget implements Controller
{
2   private double myValue;

   public Widget()
   {
       myValue = 10;
   }

   public void doIt()
   {
       System.out.println( 2.0 * myValue);
   }
}

public class Thingy extends Widget
{
   public void doIt()
   {
3       System.out.println( 3.0 * myValue);
   }
}

public class Client
{
   public void doSomething()
   {
4       Controller myControl = new Thingy();
       myControl.doIt();
   }
}
```

You attempt to compile and run these classes (with a class that correctly calls the `Client doSomething` method). Which of the following best describes the outcome?

- A. The code does not compile because in line 1 the `doIt` method is not declared public.
- B. The code does not compile because the class `Widget` cannot have a private instance variables that is not already declared in the interface `Controller`, as it does in line 2.
- C. The code does not compile because the variable `myValue` cannot be accessed within the class `Thingy`, as it is in line 3.
- D. The code does not compile because an instance of class `Thingy` is not type-compatible with `Controller`, as indicated in line 4.
- E. The code compiles and runs with the value 30 output when a call to `doSomething` is made.

AP Computer Science A Review Test 2

31. (A6) The following method sorts the Comparable array parameter from largest to smallest.

```
public static void sort(Comparable[] list)
{
    for(int start = 0; start < list.length-1; start++)
    {
        int index = start;
        for(int k = start + 1; k < list.length; k++)
        {
            if(list[k].compareTo(list[index]) > 0)
                index = k;
        }
        Comparable temp = list[start];
        list[start] = list[index];
        list[index] = temp;
    }
}
```

Assume the String array `word` is initialized as shown below.

word	Bill	Joe	Sue	Ann	Mel	Zeb
------	------	-----	-----	-----	-----	-----

Which of the following best represents the array `word` after the third pass through the outer loop in the call `sort(word)`?

- A.

Bill	Ann	Mel	Zeb	Sue	Joe
------	-----	-----	-----	-----	-----
- B.

Joe	Sue	Zeb	Ann	Mel	Bill
-----	-----	-----	-----	-----	------
- C.

Zeb	Sue	Mel	Ann	Joe	Bill
-----	-----	-----	-----	-----	------
- D.

Ann	Bill	Joe	Mel	Zeb	Sue
-----	------	-----	-----	-----	-----
- E.

Mel	Sue	Joe	Ann	Zeb	Bill
-----	-----	-----	-----	-----	------

32. (CTA4) The following code segment is intended to compute the product of the first 5 even integers, starting with 2.

```
product = 0;
for(int k = 1; k <= 5; k++)
{
    product *= 2*k;
}
```

Which of the following best describes the error, if any, in this code.

- A. The segment works as intended.
- B. The segment computes the product of the first four even integers
- C. The segment computes the product of the first ten even integers
- D. The loop bounds are incorrect, "`k <= 5`" should be replaced with "`k < 5`"
- E. The variable `product` is incorrectly initialized. The segment would work as intended if `product` were initialized to 1.

AP Computer Science A Review Test 2

33. (C12) Consider the following declarations.

```
public class ColorBox
{
    public ColorBox()
    {
        System.out.print("black ");
    }

    public void showColor()
    {
        System.out.print("red ");
    }
}
public class BlueGreenBox extends ColorBox
{
    public BlueGreenBox()
    {
        System.out.print("blue ");
        super();
    }

    public void showColor()
    {
        System.out.print("green ");
        super.showColor();
    }
}
```

The following statements occur in a client method:

```
ColorBox box = new BlueGreenBox();
box.showColor();
```

What happens when these classes and the client are compiled and executed?

- A. blue black green red is printed
- B. black blue green red is printed
- C. black blue black green red is printed
- D. black blue black red green red is printed
- E. The classes and code fail to compile correctly

34 (A22). Consider the following incomplete method.

```
// precondition: 0.0 <= prob <= 1.0
public boolean chance(double prob)
{
    // statement
}
```

The method `chance` is intended to return `true` with a probability `prob` and `false` with a probability `1.0 - prob`. Which of the following replacements for `// statement` will make the method `chance` work as intended?

- A. `return prob < Math.random();`
- B. `return Math.random() < prob;`
- C. `return prob < (1 - Math.random());`
- D. `return (1 / prob) < Math.random();`
- E. `return Math.random() < (1 / prob);`

AP Computer Science A Review Test 2

35. (A8) Consider the following data field and method.

```
private String[] list;  
  
public void change()  
{  
    for(int k = 0; k < list.length - 1; k++)  
    {  
        if(list[k].equals(list[k+1]))  
            list[k+1] = "";  
    }  
}
```

Assume that `list` is initialized as shown below.

list	alex	alex	brad	nils	nils	nils	pete	pete	pete	pete
------	------	------	------	------	------	------	------	------	------	------

Which of the following shows `list` after a call to method `change`?

- A.

alex	brad	nils	pete
------	------	------	------
- B.

alex		brad	nils			pete			
------	--	------	------	--	--	------	--	--	--
- C.

alex		brad	nils		nils	pete		pete	
------	--	------	------	--	------	------	--	------	--
- D.

alex		brad		nils			pete		pete
------	--	------	--	------	--	--	------	--	------
- E.

alex	alex	brad	nils	nils	nils	pete	pete	pete	pete
------	------	------	------	------	------	------	------	------	------

36. (R8) Consider the following two methods that are declared within the same class.

```
public int supplement(int value)  
{  
    if(value < 50)  
        return reduce(value + 10);  
    else  
        return value;  
}  
  
public int reduce(int value)  
{  
    if(value > 0)  
        return supplement(value - 5);  
    else  
        return supplement(value);  
}
```

What will be returned as a result of the call `supplement(40)`?

- A. 0
B. -5
C. 50
D. 55
E. Nothing will be returned due to an infinite recursion.

AP Computer Science A Review Test 2

37. (A10) Consider the partial method definition.

```
// len > 2
public void printBox(int len)
{
    /* method body */
}
```

This method is intended to print a hollow box as diagrammed below, where the number of stars along each side is given by the parameter `len`, where `len > 2`. The result of the call `printBox(6)` would be this diagram.

```
*****
*      *
*      *
*      *
*      *
*      *
*****
```

Which of the following replacements for `/* method body */` would make the method `printBox` work as intended?

A.

```
for(row = 0; row < len; row++)
{
    for(k = 0; k < len; k++)
        System.out.print("*");
    System.out.println();
}
```

B.

```
for(star = 0; star < len; star++)
    System.out.print("*");
for(row = 0; row < len; row++)
{
    for(k = 0; k < len; k++)
        System.out.print(" ");
    System.out.println();
}
for(star = 0; star < len; star++)
    System.out.print("*");
```

C.

```
for(star = 0; star < len; star++)
    System.out.print("*");
for(row = 0; row < len; row++)
{
    System.out.print("*");
    for(k = 0; k < len; k++)
        System.out.print(" ");
    System.out.println("*");
}
for(star = 0; star < len; star++)
    System.out.print("*");
```

D.

```
for(star = 0; star < len; star++)
    System.out.print("*");
for(row = 1; row < len-1; row++)
{
    System.out.print("*");
    for(k = 0; k < len; k++)
        System.out.print(" ");
    System.out.println("*");
}
for(star = 0; star < len; star++)
    System.out.print("*");
```

E.

```
for(star = 0; star < len; star++)
    System.out.print("*");
for(row = 1; row < len-1; row++)
{
    System.out.print("*");
    for(k = 1; k < len-1; k++)
        System.out.print(" ");
    System.out.println("*");
}
for(star = 0; star < len; star++)
    System.out.print("*");
```

AP Computer Science A Review Test 2

38. (CTA6) Consider the following code segment.

```
for(int num = 5; num > 0; num--){
    if(num % 2 == 1){
        for(int star = 0; star < num; star++){
            System.out.print("*");
            System.out.println();
        }
    }
}
```

What will be printed when this code segment is executed?

- A.
- ```
*
**


```
- B.
- ```
*  
***  
*****
```
- C.
- ```

```
- D.
- ```
*****  
***  
*
```
- E.
- ```

**
```

39. (DS4) A class is being developed to store a collection of objects, each of which has methods to return its name, return its value, and change its value. The class will store the objects in an ArrayList in increasing order by value, since a frequent operation will be to print the objects' names in increasing order of the value. Other operations will be to look up an individual object by name and either return its value or change its value and adjust the ArrayList as necessary. Which of the following is the best design decision for this class?

- A. Supply a public method that returns the index of an item, given its name, and make the ArrayList public so that the client class can use the given method to get the index, then directly access or change the value of the item, and reorder the ArrayList as necessary. The client can also access the ArrayList directly to print it in order.
- B. Supply a public method that returns the value of an item, given its name, and make the ArrayList public. The client class can the directly manipulate the ArrayList as needed and can directly access the ArrayList to print it in order.
- C. Supply a public method that returns the index of an item, given its name. Supply another method that returns a reference to the ArrayList. The client class can use the first method to get the index, then use the second method to directly access or change the value of the item in the ArrayList and reorder the ArrayList as necessary. The client can also access the ArrayList using the second method to print it in order.
- D. Write separate methods for finding an item by name and returning its value, finding an item by name and changing its value, reordering the ArrayList as necessary, and printing the ArrayList in order, with no private helper methods.
- E. Supply a private helper method that returns the index of the item, given its name. This method is then used by public methods that either return the value of the item given by name or change the value of the item given by name and reorder the ArrayList appropriately. A separate method will print the contents of the ArrayList in order.

## AP Computer Science A Review Test 2

40. (A12) Consider the following data field and method.

```
private ArrayList<String> list; // contains Strings or nulls

public void changeList()
{
 int currentLoc = 0;
 int nonNullLoc = 0;

 while(currentLoc < list.size() && list.get(currentLoc) != null)
 {
 currentLoc++;
 nonNullLoc++;
 }

 while(nonNullLoc < list.size() && list.get(nonNullLoc) == null)
 nonNullLoc++;

 while(nonNullLoc < list.size())
 {
 list.set(currentLoc, list.get(nonNullLoc));
 list.set(nonNullLoc, null);
 currentLoc++;
 while(nonNullLoc < list.size() && list.get(nonNullLoc) == null)
 nonNullLoc++;
 }
}
```

Assume that `list` is initially the following array.

|         |      |      |        |         |      |         |         |      |
|---------|------|------|--------|---------|------|---------|---------|------|
| "Clint" | null | null | "Barb" | "Chris" | null | "Lorei" | "Carei" | null |
|---------|------|------|--------|---------|------|---------|---------|------|

Which of the following best represents `list` after the call `changeList()`?

- A. 

|         |      |      |        |         |      |         |         |      |
|---------|------|------|--------|---------|------|---------|---------|------|
| "Clint" | null | null | "Barb" | "Chris" | null | "Lorei" | "Carei" | null |
|---------|------|------|--------|---------|------|---------|---------|------|
- B. 

|      |        |         |         |         |      |      |      |      |
|------|--------|---------|---------|---------|------|------|------|------|
| null | "Barb" | "Chris" | "Lorei" | "Carei" | null | null | null | null |
|------|--------|---------|---------|---------|------|------|------|------|
- C. 

|         |        |         |         |         |      |      |      |      |
|---------|--------|---------|---------|---------|------|------|------|------|
| "Clint" | "Barb" | "Chris" | "Lorei" | "Carei" | null | null | null | null |
|---------|--------|---------|---------|---------|------|------|------|------|
- D. 

|        |         |         |         |         |      |      |      |      |
|--------|---------|---------|---------|---------|------|------|------|------|
| " Barb | "Carei" | "Chris" | "Clint" | " Lorei | null | null | null | null |
|--------|---------|---------|---------|---------|------|------|------|------|
- E. 

|         |        |         |         |         |
|---------|--------|---------|---------|---------|
| "Clint" | "Barb" | "Chris" | "Lorei" | "Carei" |
|---------|--------|---------|---------|---------|