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Name:

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EXAM: e01: Midterm 1 MW

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ready?	date	points
true	Tue 02/18 11:00AM	100

You may not collaborate on this exam with anyone. If you need to use the restroom, you must leave your cell phone with the exam proctor before leaving the room.

- Write your name at the top of this page **AND EVERY ODD NUMBERED PAGE.**
- Double check that you turned in ALL pages; look for "End of Exam" on the last page.
- This exam is **closed book, closed notes**, **closed mouth, cell phone off.**
- You are permitted **one sheet of paper** (max size 8.5x11") on which to write notes.
- This sheet will be collected with the exam, and might not be returned.
- Please write your name on your notes sheet.

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1. (10 pts) Refer to the code for the class `Dog` with a `main` that creates some `Dog` objects, found on p.2 of Handout B

   Your job: figure out after which line of main() each of the following Dog objects is eligible for garbage collection.

   If an object is still not eligible for garbage collection when the last line of main is reached, write "never". Each answer should be a line number, or the word never.

Object	Fill in line here
(a) `Kiki`	
(b) `Logan`	
(c) `Max`	
(d) `Nicky`	
(e) `Olive`	

2. In Java, `java.util.TreeMap<K,V>` is a class that implements the `java.util.Map<K,V>` interface. Given those facts, for each of the statements below, check whether it is valid, or invalid.

   You do not need to explain your answer.

`Map<String,Object> a = new Map<String,Object>();`	(3 pts) ☐ Valid ☐ Invalid
`TreeMap<String,Long> c = new TreeMap<String,Long>();`	(3 pts) ☐ Valid ☐ Invalid
`TreeMap<String,Object> d = new Map<String,Object>();`	(3 pts) ☐ Valid ☐ Invalid
`Map<String,String> b = new TreeMap<String,String>();`	(3 pts) ☐ Valid ☐ Invalid

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3. Page 2 of Handout A has some useful reference material for the problems below.

a. (10 pts) Suppose you have a class `Student` that does not currently implement the interface `Comparable<Student>`. This class has a private data member of type `int` called `perm`.

There is no getter for `perm`. Note that you *do not need one* to solve this problem, and the solution does not involve writing one.

To make the class implement `Comparable<Student>`, you'd have to change the first line:

- from: `public class Student {`
- to: `public class Student implements Comparable<Student> {`

You'd also need to add one method. Write that method completely, as it would appear inside class `Student`. Assume that the "natural order" of `Student` objects is to be sorted by `perm` in increasing order.

b. (10 pts) Suppose you have a class `Book` that:

- does NOT implement `Comparable<Book>`.
- has a method `public String getTitle()`

Further, suppose that `books` is a reference to an `ArrayList<Book>` instance.

Write the code to sort `books` by title, using a built-in `sort` method of `java.util.Collections` and a suitable `Comparator` implemented as a lambda function.

You don't need to write a complete method or class, just the code needed, assuming that `books` is already declared and instantiated.

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4. The questions on this page are "job interview" questions.

   In each case, your answer will be graded partially on correctness, and partially on whether the answer would help you get the job. Your answer should be:

   - Not too long, and rambling. That annoys the interviewer and wastes time.
   - Not too short. It's too short if it leaves out so much detail that the the interviewer isn't sure whether you really understand the concept.

   a. (10 pts) The interviewer asks:

      I see from your resume that you've worked with Maven. Please tell me:

      - What's the purpose of the `<dependencies>` section of the `pom.xml` file, and
      - When would you need to add something to that section?

      Give an answer that covers both parts of the interviewer's question.

   b. (6 pts) When using `git` we work with both branches and remotes. Describe a situation where, as a developer, you'd work with more than one branch.

5. (3 pts) In the familiar `git push origin master`, which one is `origin`? Check one: ☐ A branch ☐ A remote

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6. For this question, you need page 1 of Handout A and page 1 of Handout B.

There, you will find code for these files: `Beverage.java`, `Edible.java`, `Food.java`, `FreeCandy.java` and `Product.java`. These are classes used by a grocery store known as "Trader Bobs".

Some of these methods will compile and run, while others will not.

Indicate, for each method, whether it compiles or not, in context of the code on page 1 of Handout A and page 1 of Handout B and assuming the methods appear inside this class:

```
public class TraderBobs {
 // methods appear here
}
```

You do not need to indicate the output, or the reason; only whether it does, or does not compile.

a. (3 pts)

```
public static void TB40 () {
  Food f40 = new Food(199,"Gummi Bears",520,5);
  System.out.println(f40.getWeight());
}
```

Will it compile?
☐ Yes
☐ No

b. (3 pts)

```
public static void TB41 () {
  Product b41 = new Beverage(89,"Diet Coke",0,12.0);
  System.out.println(b41.getPrice());
}
```

Will it compile?
☐ Yes
☐ No

c. (3 pts)

```
public static void TB42 () {
  Beverage b42 = new Beverage(89,"Diet Coke",0,12.0);
  System.out.println(b42.getFluidOunces());
}
```

Will it compile?
☐ Yes
☐ No

d. (3 pts)

```
public static void TB43 () {
  FreeCandy f43 = new FreeCandy(50);
  System.out.println(f43.getName());
}
```

Will it compile?
☐ Yes
☐ No

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7. Continued from previous problem…

Some of these methods will compile and run, while others will not.

Indicate, for each method, whether it compiles or not in context of the code on page 1 of Handout A and page 1 of Handout B and assuming the methods appear inside this class:

```
public class TraderBobs {
 // methods appear here
}
```

a. (3 pts)

```
public static void TB44 () {
  Product p44 = new Beverage(199,"Milk",120,6.75);
  System.out.println(p44.getName());
}
```

Will it compile?
☐ Yes
☐ No

b. (3 pts)

```
public static void TB45 () {
  Food f45 = new Food(99,"Peanuts",100,0.63);
  System.out.println(f45.getPrice());
}
```

Will it compile?
☐ Yes
☐ No

c. (3 pts)

```
public static void TB46 () {
  Edible e46 = new Beverage(89,"Diet Coke",0,12.0);
  System.out.println(e46.getCalories());
}
```

Will it compile?
☐ Yes
☐ No

d. (3 pts)

```
public static void TB47 () {
  Product p47 = new Product(299, "Fuzzy Dice");
  System.out.println(p47.getPrice());
}
```

Will it compile?
☐ Yes
☐ No

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8. Continued from previous problem…

Some of these methods will compile and run, while others will not.

Indicate, for each method, whether it compiles or not, in context of the code on page 1 of Handout A and page 1 of Handout B and assuming the methods appear inside this class:

```
public class TraderBobs {
 // methods appear here
}
```

a. (3 pts)

```
public static void TB48 () {
  Product p48 = new Food(249,"Kind Bar",200,1.4);
  System.out.println(p48.getName());
}
```

Will it compile?
☐ Yes
☐ No

b. (3 pts)

```
public static void TB49 () {
  Edible e49 = new Product(299, "Fuzzy Dice");
  System.out.println(e49.getCalories());
}
```

Will it compile?
☐ Yes
☐ No

c. (3 pts)

```
public static void TB50 () {
  Edible e50 = ()->99 ;
  System.out.println(e50.getCalories());
}
```

Will it compile?
☐ Yes
☐ No

d. (3 pts)

```
public static void TB51 () {
  Edible e51 = new Edible() {
    public int getCalories() {
      return 75;
    }
  };
  System.out.println(e51.getCalories());
}
```

Will it compile?
☐ Yes
☐ No

e. (3 pts)

```
public static void TB52 () {
  Product p52 = new FreeCandy(42);
  System.out.println(p52.getName());
}
```

Will it compile?
☐ Yes
☐ No

End of Exam