Problem Set 4, Part I

Please start your answer to each problem on a new page, as we have done below!

Problem 1: Understanding and using inheritance
1-1) Truck and Vehicle

1-2) Yes. TractorTrailer object has direct access to the public method of its superclass Vehicle.

1-3) *Add your definition of the Limousine class below:*

```
public class Limousine extends Automobile {
    private boolean sunRoof;
    private int champagne;

    public Limousine(String make, String model, int year, int numSeats,
boolean sunRoof, int champagne) {
        super(make, model, year, numSeats, false);
        this.sunRoof = sunRoof;
        if (champagne < 0) {
            throw new IllegalArgumentExeception();
        }
        this.champagne = champagne;
    }

    public boolean getSunRoof() {
        return this.sunRoof;
    }

    public int getChampagne() {
        return this.champagne;
    }

    public String toString() {
        String str = this.getMake() + " " + this. getModel() + "(seats
up to" + this.numSeats-2 + " customers)";
        return str;
    }
}
```

Problem 2: Inheritance and polymorphism

2-1) It overrides the equals() method of the Object class. The default
equals() method is defined in the Object class and can compare whether two
strings are the same.

2-2) a, b, x, y, c

2-3)

which println statement?	which method is called?	will the call compile (yes/no?)	if the call compiles, which version of the method will be called?
first one	one()	yes	the Yoo version
second one	two()	yes	the Woo version
third one	three()	no	–
fourth one	equals()	yes	the Zoo version
fifth one	toString()	yes	the Woo version

2-4)
```
public double avg() {
    return (this.u + this.t + this.getA())/3.0;
```

2-5)
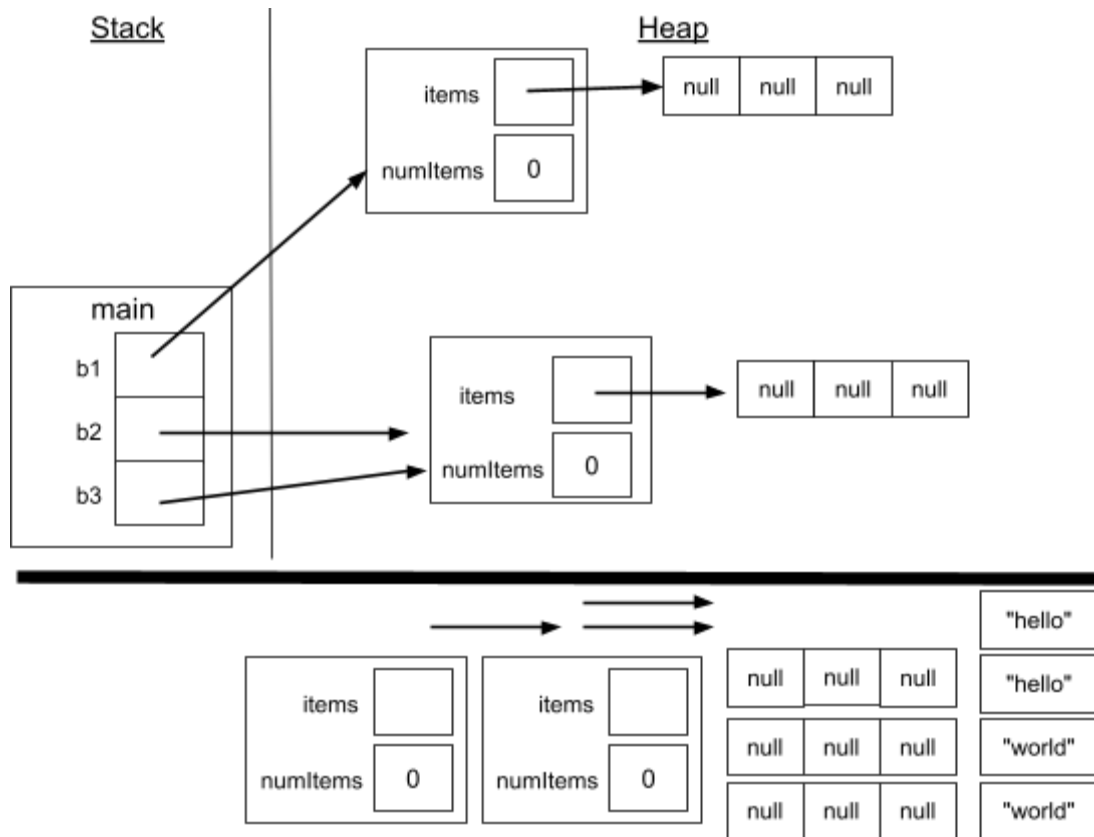**a)** No. Woo is not a superclass of Too.

b) Yes. Zoo is a superclass of Woo.
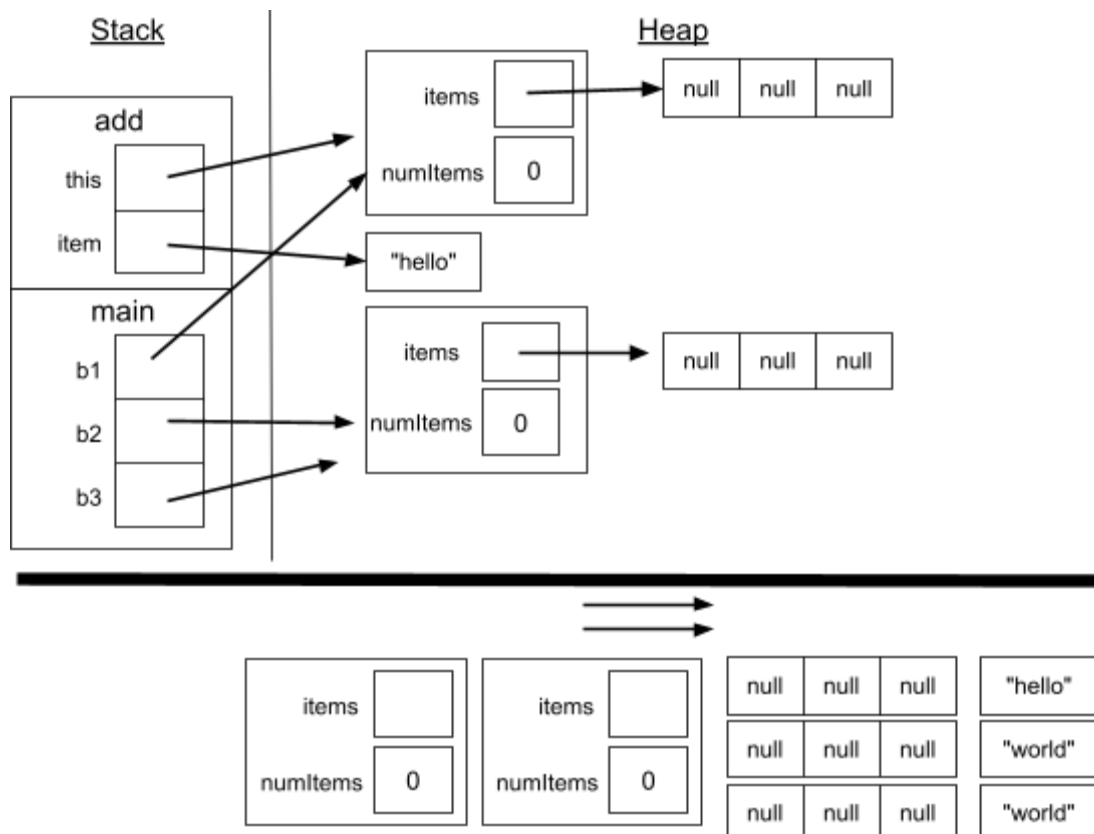
c) Yes. Zoo is a superclass of Yoo.

d) No. Too is a subclass of Zoo.
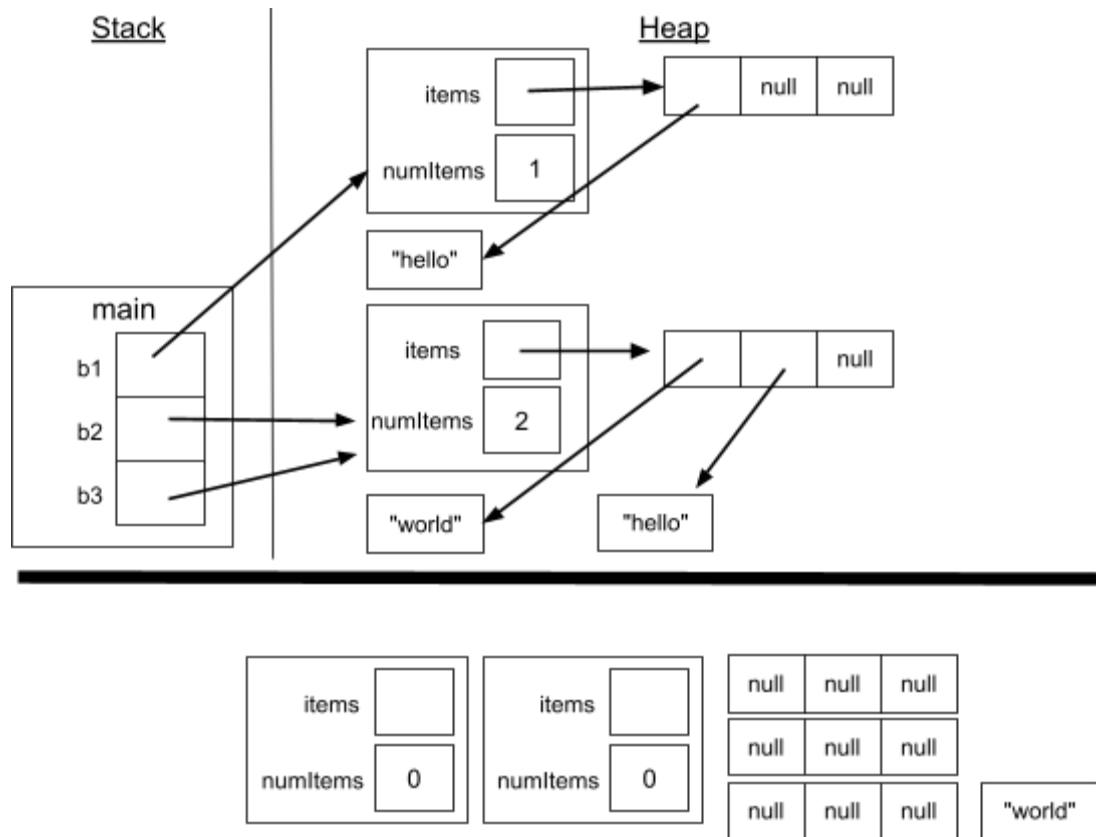
Problem 3: Memory management and the `ArrayBag` class

3-1)

Stack

Heap

main

b1

b2

b3

items → | null | null | null |

numItems | 0 |

items → | null | null | null |

numItems | 0 |

→
⇒

| | "hello" |

items | | null | null | null | "hello" |

numItems | 0 |

items | | null | null | null | "world" |

numItems | 0 |

| null | null | null | "world" |

3-2)

Stack

Heap

add

this

item

main

b1

b2

b3

items → | null | null | null |

numItems | 0 |

"hello"

items → | null | null | null |

numItems | 0 |

→
⇒

items | |

numItems | 0 |

items | |

numItems | 0 |

| null | null | null | "hello" |

| null | null | null | "world" |

| null | null | null | "world" |

3-3)

3-4)
```
{hello}
{world, hello}
{world, hello}
```