Name _____ TA _____ Login name _____

- Turn off your cell phone to avoid losing a letter grade when it rings.
- Use the amount of space provided to gauge how much you should write. Brevity is the soul of points. Points are not related to wit.
- Legibility counts, so be neat. If your writing is smaller than the typeface of this exam, I may deduct points.
- Points may be deducted for irrelevant, meaningless, or contradictory statements (and of course, just plain false statements). Please be sure to answer the question I asked!
- Do not complicate an example. Do not make up features of an example unless directed to do so. Simple is best! What is the name of our client?
- Some questions look hard at first, but if you for(i=0;i<3;i++) breatheDeeply(); you realize it is simpler than you first thought.
- **Do not change code I have written** unless explicitly directed to do so.

1. (6 pts) What is the signature (name, parameters, types) of the method that a Comparable object must have?

   _____

2. (3 pts) When we pass a Comparator object as a parameter, instead of passing a method, that is an example of

   _____

3. (6 pts) Is it possible to change the underlying collection while using an Iterator over that collection? Explain very briefly.

4. (6 pts) What methods must every Iterator have?

Answer the following based on class discussion:

5. (4 pts) To mature, juvenile blue crabs migrate from _____ to _____.

6. (4 pts) What two human-made structures are commonly used to prevent erosion?

7. (4 pts) What three states are our client reserves located in?

   _____ _____ _____

8. (20 pts) Read the whole program, then fill in the blanks to complete the program. You may not need to fill all lines.

```
public class Comparisons {

    public static void main(String[] args) {

        List<Wombat> herd;

        //ASSUME the list is now full of Wombats

        //sort the list by number of legs, increasing order (3,4,5,...)

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________
    }
}

class Wombat {
    public int numLegs;
    public String name;
}

class WombatLegsCompare _____________________________________________
{

    _____________________________________________________________

    _____________________________________________________________

    _____________________________________________________________

    _____________________________________________________________
}
```

9. (25 pts) This page is all one class.

```
import java.util.Iterator;

public class MyStepper implements Iterator<Integer>{

        int state = 0;
        int step;

        //WRITE A CONSTRUCTOR

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

// THIS MAIN PRINTS:
// 4 8 12 16 20 24 28 32 36 40 44 48 52
// 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

        public static void main(String[] args) {
                for (Iterator<Integer> sIter = new MyStepper(4); sIter.hasNext();){
                        System.out.print(" " + sIter.next());
                }
                System.out.println();

                for (Iterator<Integer> sIter = new MyStepper(2); sIter.hasNext();){
                        System.out.print(" " + sIter.next());
                }
                System.out.println();
        }

        //Write any other code this class needs to make main() work as shown.

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

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        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

        _____________________________________________________________

}
```

10. (12 pts) Look at the paint() method below. Rewrite it so that it is shorter and cleaner using one or more techniques discussed in lecture.

```
public class Animation3 extends JPanel {

    final int FRAME_COUNT = 10;
    int picNum = 0;
    BufferedImage[] pics;
    int xloc = 0;
    int yloc = 0;
    final int xIncr = 8;
    final int yIncr = 2;

    // cycle through picture array
    public void paint(Graphics g) {
        picNum = picNum + 1;
        if (picNum < FRAME_COUNT)
            g.drawImage(pics[picNum], xloc+=xIncr, yloc+=yIncr, Color.gray, this);
        else {
            picNum = picNum - FRAME_COUNT;
            g.drawImage(pics[picNum], xloc+=xIncr, yloc+=yIncr, Color.gray, this);
        }
    }

    //Make frame, loop on repaint and wait
    public static void main(String[] args) {
        JFrame frame = new JFrame();
        frame.getContentPane().add(new Animation3());
        frame.setBackground(Color.gray);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(800, 300);
        frame.setVisible(true);
        for(int i = 0; i < 1000; i++){
                frame.repaint();
                try {
                        Thread.sleep(100);
                } catch (InterruptedException e) {
                        e.printStackTrace();
                }
        }
    }
```

Write the new version here:

```
import java.util.*;

public class C {
    public static void main(String[] args) {
        Set<String> s = new HashSet<String>();
        for (String a : args)
            if (!s.add(a))
                System.out.println("here: " + a);

        System.out.println(s.size() + " there: " + s);
    }
}
```

Read the above code and think about input that will demonstrate what the code can do.

11. (5 pts) Show how to run this program in the shell or command line with that input:

---

12. (5 pts): Explain briefly how the output would be different from the input:

Do not write answers below this line.