HW 4 Problem 1

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1 SPECIFICATIONS ARE IN CODE, TOO ANNOYING TO PUT IN HERE

2 Edge

```
public final class Edge {
    private final String start;
    private final String end;
    private final int label;
    public Edge(String start, String end, int label) {
        this.start = start;
        this.end = end;
        this.label = label;
        checkRep();
    }
    public String start() {
        return start;
    }
    public String end() {
        return end;
    }
    public int label() {
        return label;
    }
    private void checkRep(){
        if(start == null) {
            RuntimeException("start == null");
        }
        if(end == null) {
            RuntimeException("end == null");
        }
    }
}
```

3 Graph

```java
public final class Graph {
    private final String[] nodes;
    private final Edge[] edges;

    public Graph() {
        nodes = new String[0];
        edges = new Edge[0];
        checkRep();
    }

    public Graph(String[] nodes, Edge[] edges) {
        this.nodes = nodes;
        this.edges = edges;
        checkRep();
    }

    public String[] nodes() {
        return nodes;
    }

    public Edge[] edges() {
        return edges;
    }

    public Graph addNode(String n) {}

    public Graph addEdge(Edge e) {}

    public Iterator<String> listNodes(){}

    public Iterator<String> listChildren(String n){}

    private String[] append(String[] list, String s) {}

    private boolean edgeValid(Edge e) {}

    private boolean edgesValid() {}

    public int hashCode() {}

    public boolean equals(/*@Nullable*/ Object obj) {}
```

```
private void checkRep() throws RuntimeException {
    if(nodes == null) {
        throw new RuntimeException("nodes == null");
    }
    if(edges == null) {
        throw new RuntimeException("edges == null");
    }
    if(nodes.length == 0  edges.length != 0) {
        throw new RuntimeException("nodes.length == 0  edges.length !=
0");
    }
}
}
```