Inserting and Resizing

**Q**: Draw the hash table after inserting 5. As part of this insertion, resize to M=8 buckets.

The default `hashCode` for integers returns the value of the integer.

```
public int hashCode() {
    return 17;
}
```

**Q1**: Does this hash function always, sometimes, or never work?

**Q1**: Draw the hash table after inserting 5. As part of this insertion, resize to M=8 buckets.
What is the most significant problem with the Circle class?

```java
public class Circle {
    private HashSet<Member> members;
    private String teamName;
    public int hashCode() {
        return Objects.hash(members, teamName);
    }
    public boolean equals(Object o) {
        Circle other = (Circle) o;
        return this.members.equals(other.members) && this.teamName.equals(other.teamName);
    }
    public void addMember(Member newMember) {
        members.add(newMember);
    }
}
```

Q1: What is the most significant problem with the Circle class?

Bucket Data Structure

Suppose we represent hash table buckets with LLRB trees instead of linked lists.

Give a tight asymptotic runtime bound in terms of \( N \), the total size of the hash set, for:

- `add`
- `contains`
- `remove`

Q: What are the asymptotic runtime bounds for these operations in a regular hash set?

Q1: Give a tight asymptotic runtime bound in terms of \( N \), the total size of the hash set, for:

- `add`
- `contains`
- `remove`