# CS 544, Cassandra Partitioning+Replication

**Token Map:**
token(n1) = {-2, 4}  token(n2) = {-6, 0}  token(n3) = {-4, 2, 5}

**Problem 1:** how many *nodes* are there? How many *vnodes*?

**Problem 2:** which node likely has greater resources (compute, memory, etc.)?

**Problem 3:** one of the vnode positions of n2 is drawn in the ring below. Draw the rest.

```
        n2
-8|-7|-6|-5|-4|-3|-2|-1| 0| 1| 2| 3| 4| 5| 6| 7
```

**Problem 4:** what ring positions are in the *wrapping range*? Draw the region above.

**Problem 5:** what node is responsible for each of the following tokens?

4: _____, 1: _____, 6: _____

**Problem 6:** a row's *primary key* is ("A", "B"). The primary key consists of one partition column followed by one cluster column. Which node owns this row? Assume token("A") = -3, token("B") = -6, and token(("A", "B")) = 3.

**Problem 7:** assume a new node n4 joins the cluster with vnodes -3 and -1. Which existing nodes will pass off some data to this new node?

**Ring (this is the same as the previous page, filled in for you):**

```
      n2    n3    n1    n2    n3    n1 n3
-8|-7|-6|-5|-4|-3|-2|-1| 0| 1| 2| 3| 4| 5| 6| 7
```

**Problem 8:** assuming 2x replication, what are the positions of the vnodes responsible for a row with token -1?

**Problem 9:** assuming 3x replication, what are the positions of the vnodes responsible for a row with token 1?

**Problem 10:** assume R=2, W=2, and RF=3. Assume the token of a row being written is -3. To which nodes will the coordinator attempt to write the data?

**Problem 11:** assume R=2, W=2, and RF=3. Assume the token of a row being written is -3. The timeline is as follows:

1. n1 is down
2. the row is written
3. n1 recovers, but n3 crashes
4. the row is read

Which nodes perform reads?

Which nodes perform writes?

Is the data that was written read back?

**Problem 12:** W=3 and RF=4. What should R be to make sure readers see successful writes?