AP Statistics

Chapter Three

Collecting Data

Statistical Studies

Observational Study

- No treatment imposed
- No cause and effect relationship can be concluded
- Includes surveys

Experiment

- Treatment imposed
- Cause and effect relationship can be inferred

Vocab

Explanatory variable, x -

- more than one **factor** possible

- Factors can have different **levels,** i.e aspirin at 200mg, 400mg, 800mg

- **Treatments** are the various combinations of factor(s) and their level(s)

Response variable, y

Told you there would be lots of vocab

Ex4 To test the value of help sessions outside the classroom, students could be divided into three groups, with one group receiving 4 hours of help sessions per week, a second group receiving 2 hours per week, and a third group receiving no help. What are the explanatory and response variables and what are the levels?

Explanatory Variable (x-axis) - # hours of help received

Response Variable (y-axis) - measured classroom performance

Levels - 0, 2, or 4 hours of help sessions

A note about levels is that each factor can have its own set of levels. The next example will address this

Drs. Willson and Fable have each designed a new treatment drug for infections in people recovering from injuries. They are concerned about the correct dosage of the drug (20 mg or 50 mg). They divide their subjects (experimental units) and conduct a double blind test so they will be measuring the rate at which infection shrinks. Indicate the explanatory variables (factors), levels, treatments, and response variables

One way to start your answer is to make a table of the factors involved.

Drug	Dr. Fable's Drug	Dr. Willson's Drug
20 mg	Treatment 1	Treatment 2
50 mg	Treatment 3	Treatment 4

The table shows that there are **4 treatments**. But what about factors and levels?

The **two factors** (explanatory variable) being tested are the **drug and dosage**

Drug has two levels (Fable and Heinicke), dosage has two levels (20 and 50 mg) making a total of four treatments

Drug	Dr. Fable's Drug	Dr. Heinicke's Drug
20 mg	Treatment 1	Treatment 2
50 mg	Treatment 3	Treatment 4

Random Sampling - Why Do We Do It?

Allows us to generalize our findings to the population

Simple Random Samples (SRS)

What makes it so?

A sample in which each element (person, animal, object, etc) has an equal chance of being selected

If I draw the names of everyone in a class of 30 students from a hat, each student should have a 1/30 probability of being selected

Random Sampling - Why Do We Do It?

Allows us to generalize our findings to the population

Simple Random Samples (SRS)

3 Methods

- Slips of Paper
- randInt on TI-84
- Random Digit Table

Pick a method and learn the proper write-up for your FRQs.


```
randInt(1,5,6)
(5 2 4 2 4 5)
(5 4 4 2 1
(3 5 1 1 3
(4 5 3 4 3
(2 4 1 4 3
```

```
73735 45963    78134 63873
02965 58303    90708 20025
98859 23851    27965 62394
33666 62570    64775 78428
81666 26440    20422 05720

15838 47174    76866 14330
89793 34378    08730 56522
78155 22466    81978 57323
16381 66207    11698 99314
75002 80827    53867 37797

99982 27601    62686 44711
84543 87442    50033 14021
77757 54043    46176 42391
80871 32792    87989 72248
30500 28220    12444 71840
```

Pick a method and learn the proper write-up for your FRQs.

```
MATH NUM CPX PRB
1:rand
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(
```

```
randInt(1,12)
                2
```

```
randInt(1,20147)
            4413
randInt(1,20147)
            4949
```
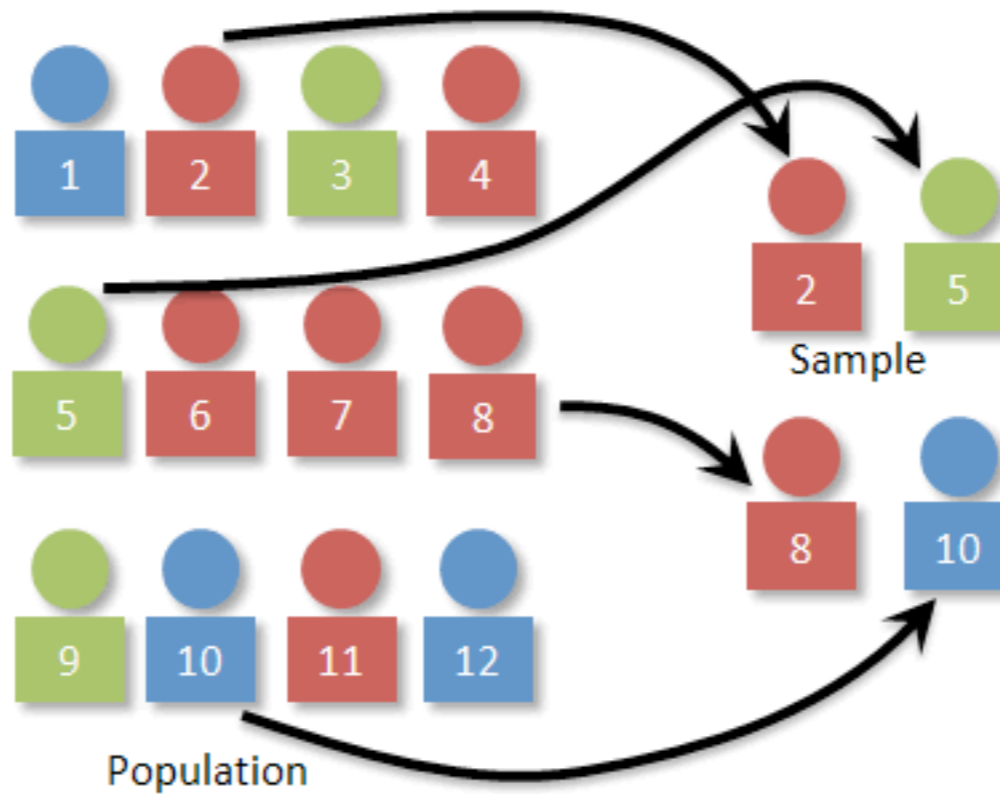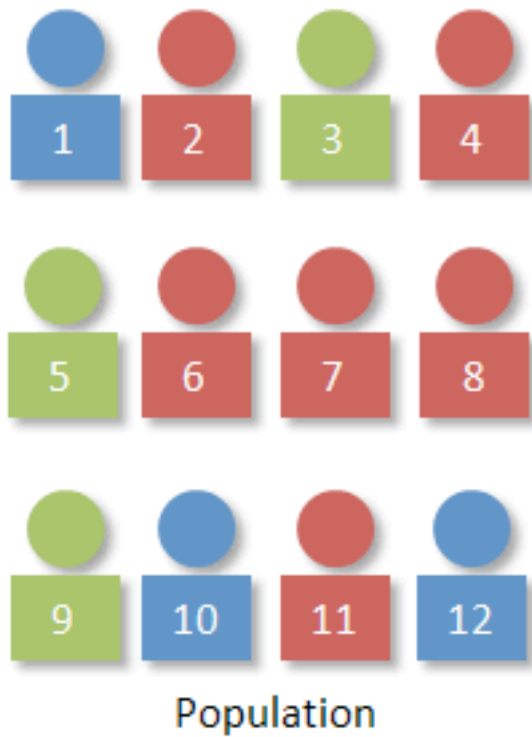
```
randInt(1,6,3)
        {5 5 3}
```

```
randInt(0,1,100)
→L₁
{1 0 1 1 0 1 1 …
```
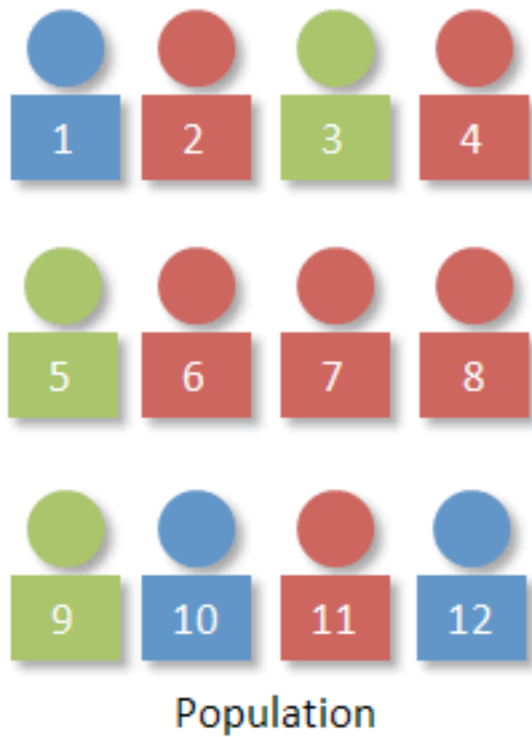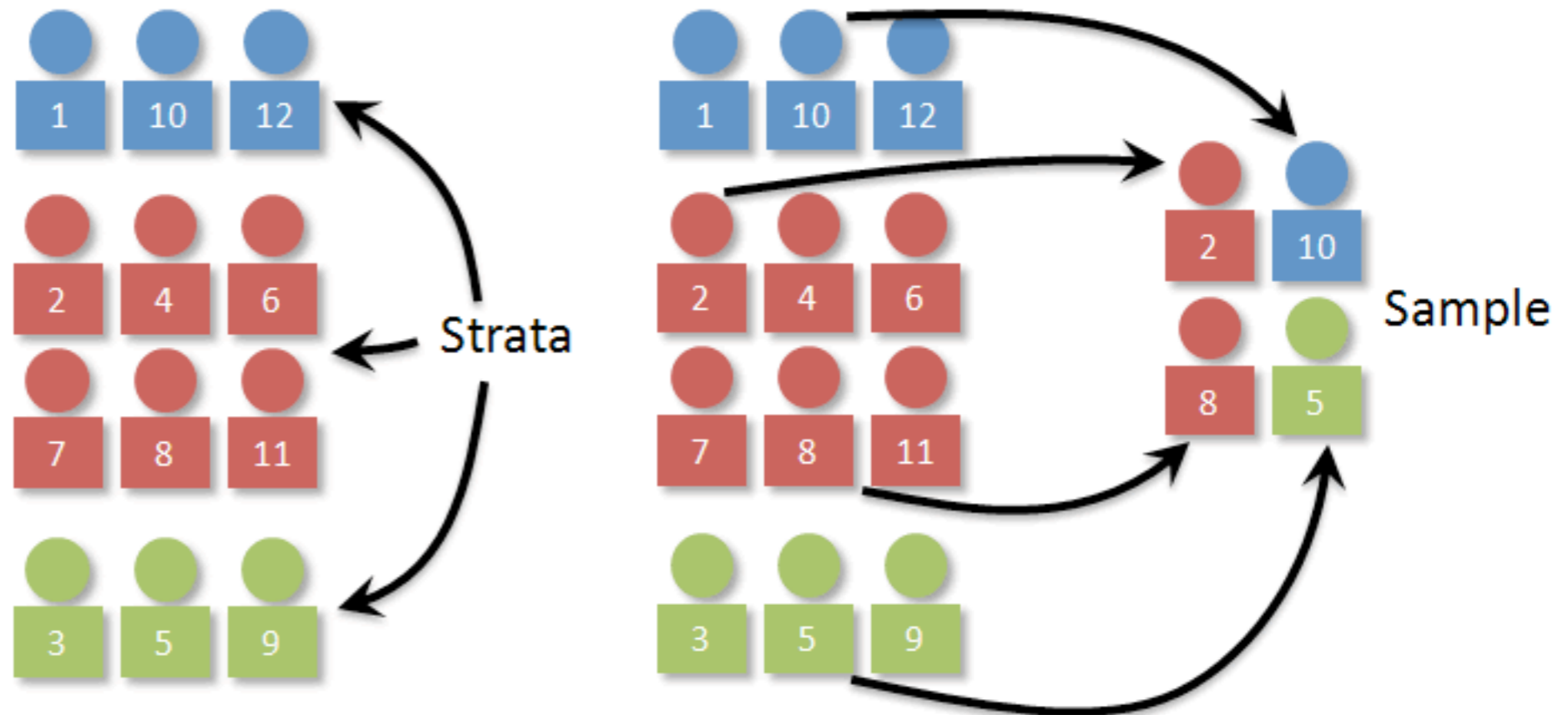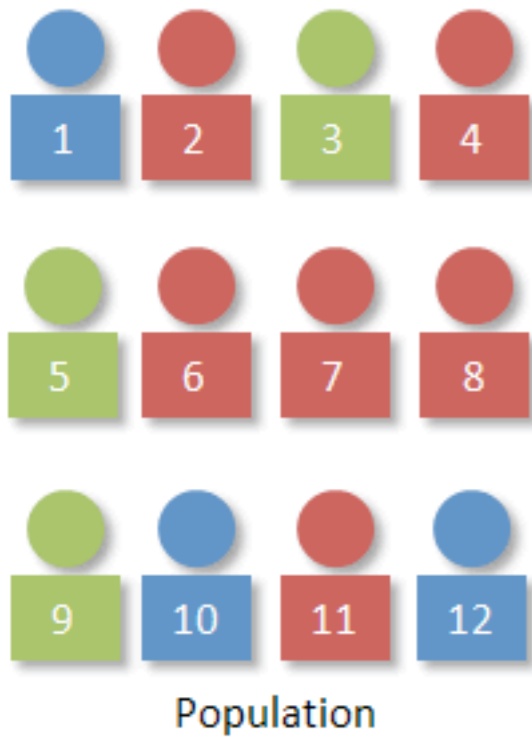
SRS of size 4

•randInt(1, 12, 4) = 10, 2, 8, 5

Stratified Sample of size 4
- randInt(1, 3, 1) = 2
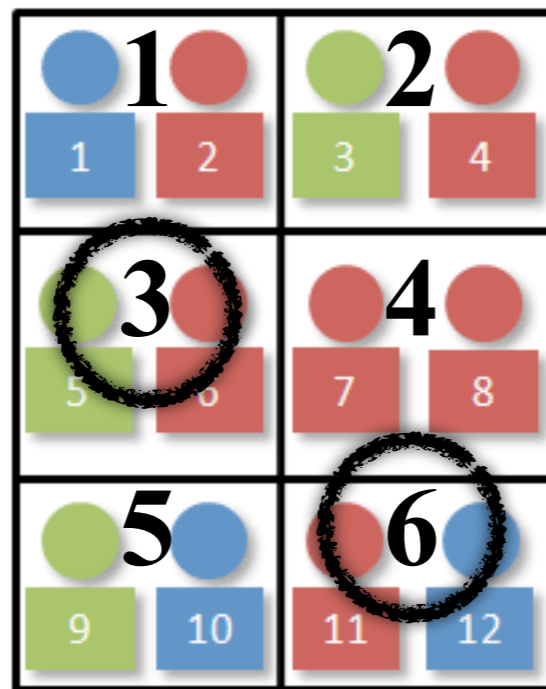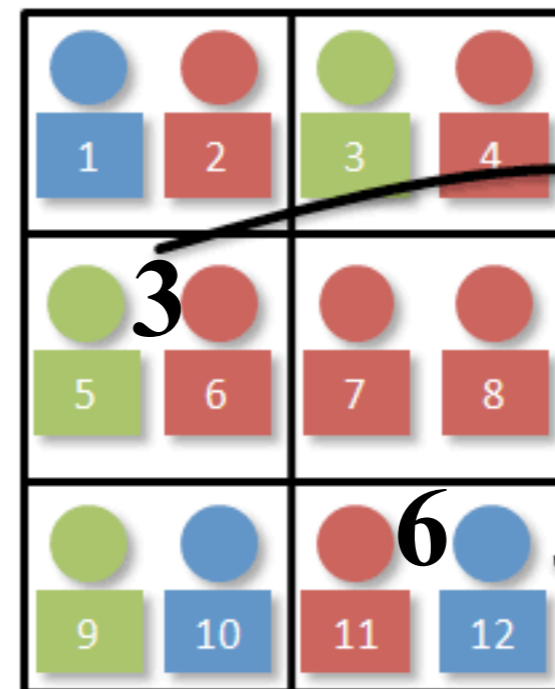- randInt(1, 6, 2) = 5, 1
- randInt(1, 3, 1) = 2

Cluster Sample of size 4

•randInt(1, 6, 2) = 3, 6
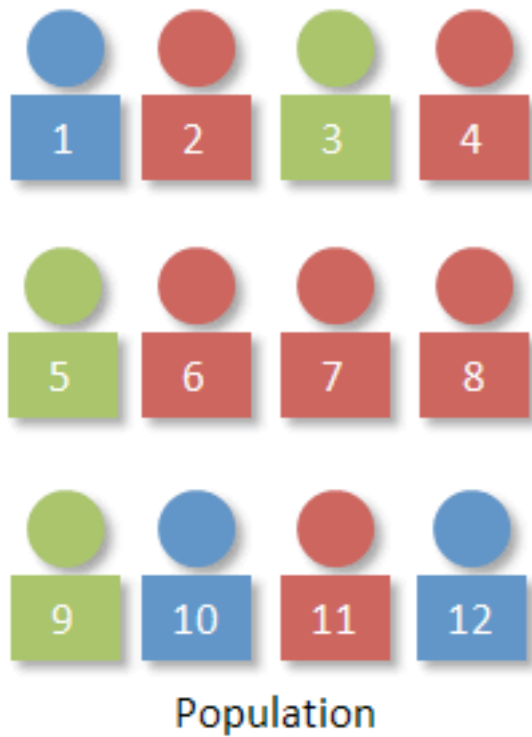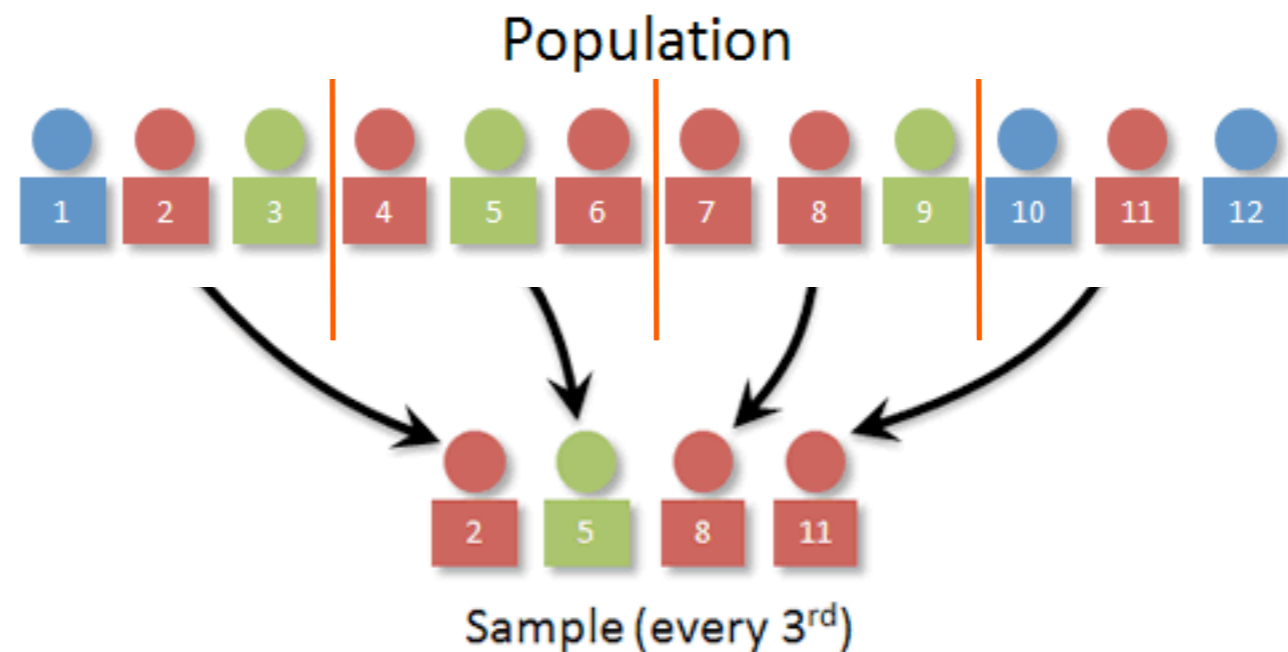
Population

Cluster Population

Cluster Population

Sample
(2 clusters)

Population

Systematic Sample of size 4

4 people in sample ->
4 groups of 3

•randInt(1, 3, 1) = 2

Population

Sample (every 3rd)

So one more time through:

Types of Sampling

- Simple Random Sample (SRS)
- Stratified Sample - homogenous strata/groups
- Cluster Sample - heterogeneous cluster/groups
- Systematic Sample
- Convenience Sample

I'm not an SRS!

Me either!

Nor me!

I'm the worst! And not even close to an SRS!

Why not an SRS? Because not every group is possible.