2.12. (a) They would probably like to make a statement about all residents of West Lafayette, IN (or, at least, all residents in this city who drive). This is the **population**. (b) The population proportion is probably larger than 14/98. People who favor two-way streets are more likely to call in to the opinion line (to argue for a change). People who are satisfied with one-way streets may not be interested in participating. This was a **voluntary response sample**, so it likely gives biased results.

2.15. Garbage in, garbage out! If 300,000 people do not adequately represent the population, then the large sample just means we have "more garbage" (think of the *Literary Digest* example). A **simple random sample** of 1000 individuals is much more likely to accurately represent the population. Simple random samples give unbiased results−on average, these samples will be representative. Phone-in polls give voluntary response samples, which are always biased.

2.19. The university student population consists of two strata: undergraduates and graduates. The 400 students (300 undergraduate and 100 graduate) form a **stratified random sample**.
(a) This sampling method gives each student an equal chance of being selected:

- The chance any undergraduate student is chosen is

$$\frac{300}{30000} = \frac{1}{100} = 0.01.$$

- The chance any graduate student is chosen is

$$\frac{100}{10000} = \frac{1}{100} = 0.01.$$

- Therefore, each student at the university has the same chance of being chosen.

(b) This is not a simple random sample (SRS). The definition of an SRS requires that each sample of 400 from the population has the same chance of being selected. One example would be a sample with 400 undergraduates. This sample is not possible according to this design, so this can't be an SRS.

2.21. See the complexes and codes at the top of the next page. If we were to use the Table of Random Digits (Table A, pp 641), starting at line 112, we would see:

59 63 68 88 **04** 04 63 47 **11** 97 **19** 35 27 30 89 84 89 84 57 85

Our SRS of apartment complexes would be Eolo, Jade Mountain, and Nihi Sumba.

Amandari	00	La Reserve	12	Sheen Falls	24
Ballyfin	01	La Residence	13	Six Senses	25
Cala de Mar	02	Las Ventanas	14	St. Regis	26
Cavas Lodge	03	Le Meurice	15	Taj Exotica	27
Eolo	04	Mandarin	16	Taj Lake Palace	28
Four Seasons	05	Montage	17	Temple House	29
Frangipani	06	Nayara Springs	18	The Lodge at Edgewood	30
Gibb's Farm	07	Nihi Sumba	19	The Lowell	31
Huka Lodge	08	Rambagh Palace	20	The Mulia	32
Inkaterra	09	Rancho Santana	21	The Oberoi	33
Inverlochin	10	Rosewood	22	Twin Farms	34
Jade Mountain	11	Saxon	23	Viceroy Riviera	35

We could also use R to select the SRS. In R, I entered the following commands:

```
> complexes = seq(0,35,1)
> sample(complexes,3,replace=F)
[1] 10 33 17
```

Our SRS of apartment complexes would be Inverlochin, The Oberoi, and Montage.

2.25. (a) The **population** is all Hispanic residents of Denver. The **sample** is the 200 adults chosen and interviewed by the police officer.
(b) I can think of two sources of potential bias:

- The interviewer is a police officer wearing his/her police uniform! Residents may not feel comfortable giving honest answers for fear of reprisal. They may give untruthful responses (in Chapter 4, we will call this a **nonsampling error**).

- If the department took an SRS from only Hispanic neighborhoods, then they are not accounting for all Hispanic residents that do not live in these neighborhoods (in Chapter 4, we will call this **undercoverage**). These two groups of Hispanic residents could think differently about racial profiling, its prevalence, and its effectiveness. Therefore, the results we get from only Hispanic neighborhoods may not accurately represent the population of all Hispanic residents in Denver.