Histogram exercises[*]

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1. The table below gives the distribution of educational levels for persons age 25 and over in the U.S. in 1960, 1970, and 1991. ("Educational level" means the number of years of schooling completed.) The class intervals include the left endpoint, but not the right; for example, from the second line of the table, in 1960 about 14% of the people had completed 5-8 years of schooling, 8 not included; in 1991, about 4% of the people were in this category. Draw a histogram for the 1991 data. You can interpret "16 or more" as 16-17 years of schooling; not many people completed more than 16 years of school, especially in 1960 and 1970. Why does your histogram have spikes at 8, 12, and 16 years of schooling?

Educational level	1960	1970	1991
0-5	8	6	2
5-8	14	10	4
8-9	18	13	4
9-12	19	19	11
12-13	25	31	39
13-16	9	11	18
16 or more	8	11	21

2. Redraw the histogram for the 1991 data, combining the first two class intervals into one (0-8 years, with 6% of the people). Does this change the histogram much?

3. Draw the histogram for the 1970 data, and compare it to the 1991 histogram. What happened to the educational level of the population between 1970 and 1991 – did it go up, go down, or stay about the same?

4. What happened to the educational level from 1960 to 1970?

5. An investigator draws a histogram for some height data, using the metric system. She is working in centimeters (cm). The vertical axis shows density, and the top of the vertical axis is 10 percent per cm. Now she wants

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to convert to millimeters (mm). There are 10 millimeters to the centimeter. On the horizontal axis, she has to change 175 cm to _____ mm, and 200 cm to _____ mm. On the vertical axis, she has to change 10 percent per cm to _____ percent per mm, and 5 percent per cm to _____ percent per mm.

6. Classify each of the following variables as qualitative or quantitative; if quantitative, as discrete or continuous.

   (a) occupation

   (b) region of residence

   (c) weight

   (d) height

   (e) number of automobiles owned

7. In the March Current Population Survey, women are asked how many children they have. Results are shown below for women age 25-39, by educational level.

   (a) Is the number of children discrete or continuous?

   (b) Draw histograms for these data. (You may take "5 or more" as 5 – very few women had more than 5 children.)

   (c) What do you conclude?

Number of children	Women who are high school graduates	Women with college degrees
0	30.2	47.9
1	21.8	19.4
2	28.4	22.7
3	13.7	8.0
4	4.4	1.5
5 or more	1.5	0.5

8. The age distribution of people in the U.S. in 2004 is shown below. Draw the historgram. (The class intervals include the left endpoint, not the right; for instance, on the second line of the table, 14% of the people were age 5 years or more but had not yet turned 15. The interval for "75 and over" can be ended at 85. Men and women are combined in the data.) Use your histogram to answer the following questions.

   (a) Are there more children age 1, or elders age 71?

   (b) Are there more 21-year-olds, or 61-year-olds?

   (c) Are there more people age 0-4, or 65-69?

   (d) The percentage of people age 35 and over is around 25%, 50%, or 75%?

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Age	Percent of population
0-5	7
5-15	14
15-20	7
20-25	7
25-30	7
30-35	7
35-45	15
45-55	14
55-65	10
65-75	6
75 and over	6

9. The American Housing Survey is done every year by the Bureau of the Census. Data from the 2003 survey can be used to find the distribution of occupied housing units (this includes apartments) by number of rooms. Results for the whole U.S. are shown below, separately for "owner-occupied" and "renter-occupied" units. Draw a histogram for each of the two distributions. (You may assume "10 or more" means 10 or 11; very few units have more than 11 rooms.)

   (a) The owner-occupied percents add up to 100.2% while the renter-occupied percents add up to 100.0%. Why?

   (b) The percentage of one-room units is much smaller for owner-occupied housing. Is that because there are so many more owner-occupied units in total? Answer yes or no, and explain briefly.

   (c) Which are larger, on the whole: the owner-occupied units or the renter-occupied units?

Number of rooms in unit	Owner-occupied (percent)	Renter-occupied (percent)
1	0.0	1.0
2	0.1	2.8
3	1.4	22.7
4	9.7	34.5
5	23.3	22.6
6	26.4	10.4
7	17.5	3.6
8	10.4	1.2
9	5.0	0.5
10 or more	6.4	0.7
Total	100.2	100.0
Number	72.2 million	33.6 million