Math 207
Introduction to Statistics

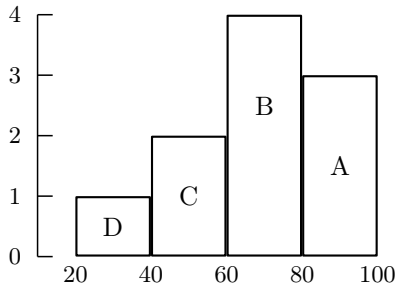
Basic Histogram Exercises

1. The histogram below shows the distribution of final scores in a certain class.

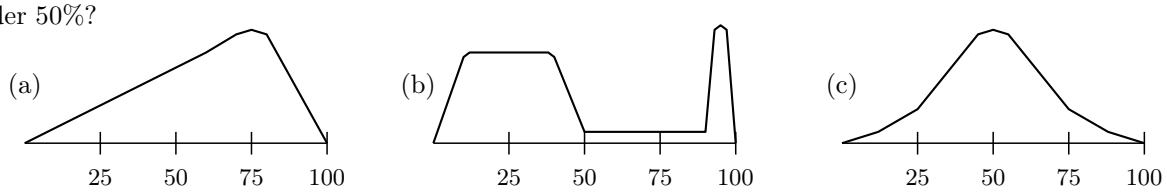
   a) Which block represents the people who scored between 60 and 80?

   b) Ten percent scored between 20 and 40. About what percentage scored between 40 and 60?

   c) About what percentage scored over 60?



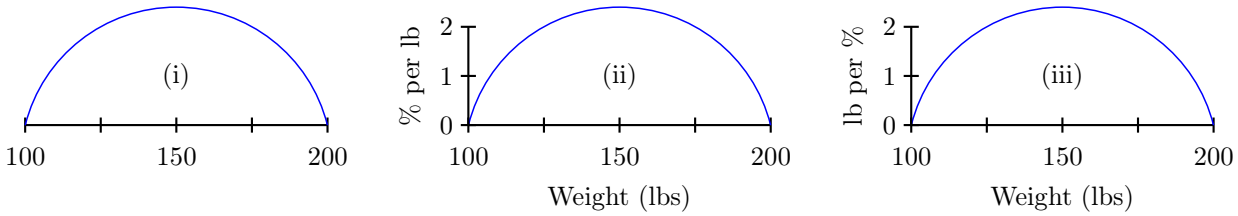
2. Below are sketches of histograms for test scores in three different classes. Scores range from 0 to 100; a passing score was 50. For each class, was the percent who passed about 50%, well over 50%, or well under 50%?



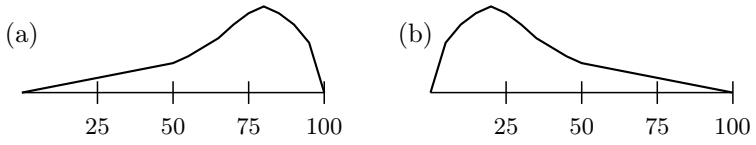
3. One class in exercise 2 had two quite distinct groups of students, with one group doing rather poorly on the test, and the other group doing very well. What class was it?

4. In class (b) of exercise 2, were there more people with scores in the range 40–50 or 90–100?

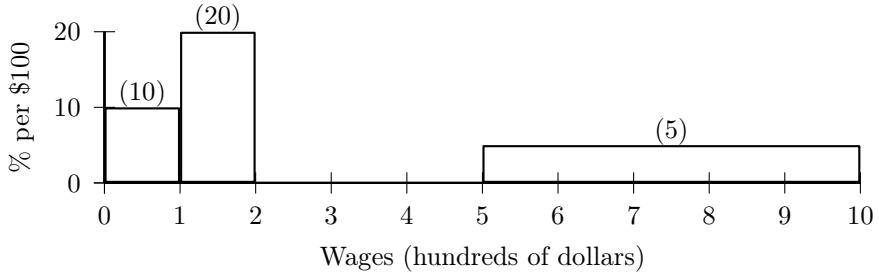
5. Three people plot histograms for the weights of subjects in a study, using the density scale. Only one is right. Which one, and why?



6. Two histograms are sketched below. One shows the distribution of age at death from natural causes (heart disease, cancer, and so forth). The other shows age at death from trauma (accident, murder, suicide). Which is which and why?



7. A histogram of monthly wages for part-time employees is shown below (densities are marked in parentheses). Nobody earned more than $1,000 per month.



a) The block over the class interval from $200 to $500 is missing. How tall must it be?

b) What percent of the employees made at least $200 per month?

c) About what percent of the employees made between $600 and $800 per month?

Solutions

1.

(a) Block B represents the people who scored between 60 and 80.

(b) Since 10% scored between 20 and 40, the area of block D is 10%. The area of block C represents the percent of people who scored between 40 and 60. It looks like this block is about twice as tall as block D. Both block have the same width. So the answer is 20%.

(c) Blocks D and C make up a total of 30%. The percentage over 60 is the other two blocks (B and A). So, their area is $100\% - 30\% = 70\%$.

2.

(a) The percent who passed was well over 50% since most of the area is above the score of 50.

(b) The percent who passed was well under 50% since most of the area is below the score of 50.

(c) The percent who passed was around 50% since the area is symmetric around the score of 50.

3. Class (b) had two distinct groups. One small group did very well. A much larger group (larger area) failed because their scores were below 50.

4. Think of the rectangle for the group that scored 90–100 and the rectangle for the group that scored 40–50. Both rectangles have width 10. The 90–100 rectangle is taller so it has a bigger area. So, more students scored 90–100 than scored 40–50.

5. Histogram (ii) is correct. It is the only one with the correct density scale on the vertical axis. Histogram (i) doesn't have a scale on either axis. On histogram (iii), the units on the vertical scale are wrong. The correct units are % per lb instead of lb per %.

6. Histogram (a) shows the distribution of ages from natural causes. Few young people will die of such causes so there is little area on the left side. Histogram (b) shows the distribution of ages from trauma. This is a more likely cause of death for young people than for old people so the histogram has a lot of area on the left side but not so much on the right.

7.

a) The areas of the three given blocks are 10%, 20% and 25%. This gives a total of 55%. The missing box must have an area of 45%. Since its width is 3, its height must be 15.

b) 100% - (10% + 20%) = 100% - 30% = 70%. Alternatively, 45% + 25% = 70%.

c) $w \times h = 2 \times 5 = 10\%$.