Histograms

Objectives

1. Create a frequency distribution for quantitative data

2. Create and interpret histograms

Frequency Distribution for Quantitative Data

The weights (in pounds) of 25 husky dogs are shown below:

53	46	44	47	50
49	47	44	61	44
35	46	49	51	48
50	52	44	50	47
58	47	52	37	54

Suppose we want to create a frequency distribution for the weights of these awesome dogs.

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Since this data is quantitative, we are going to have to decide what each of our ranges of weights in our classes is going to be.

Definitions for Quantitative Data

The smallest value (weight in our case) in each class (table row) is called the **lower class limit**.

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The difference between two consecutive lower class limits is called the **class width**.

Let's create a frequency distribution for the dog weights using a class width of 5 pounds.

Frequency Distribution of the Weights of Adorable Huskies

Weight	Frequency
35 – 39	2
40 – 44	4
45 – 49	9
50 – 54	8
55 – 59	1
60 – 64	1

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However, any dog that weighs at or above 39.5 pounds, but less than 44.5 pounds, would have to go into the 40 – 44 pound class.

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In the above table, we are only considering integer weight values.

However, any dog that weighs at or above 39.5 pounds, but less than 44.5 pounds, would have to go into the 40 – 44 pound class.

Going a half of another decimal place below the lower class limit and above the upper class limits give us the **class boundaries**.

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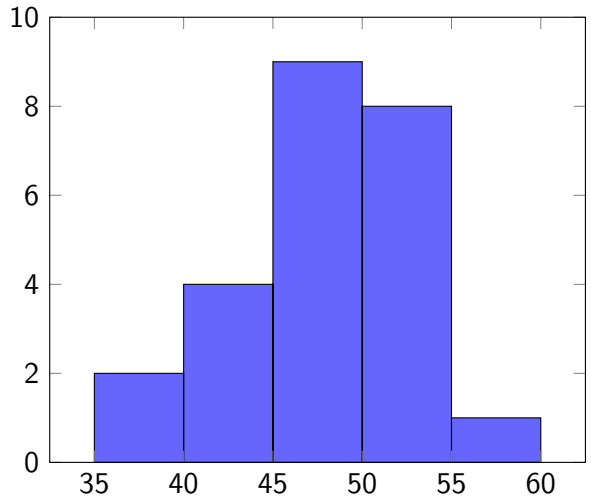

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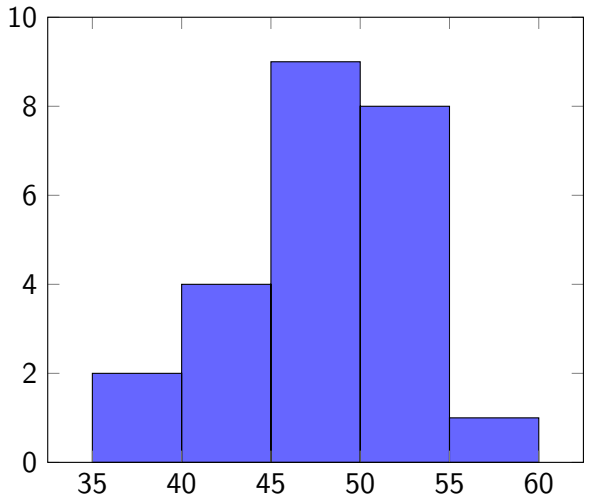

We can also use class midpoints when graphing histograms.

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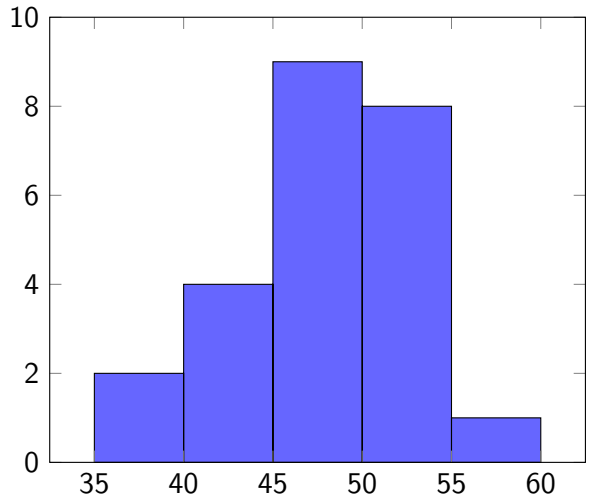

We can also use class midpoints when graphing histograms.

To find the class midpoint, add the lower class limit and upper class limit. Then divide by two.

Relative Frequency Histogram

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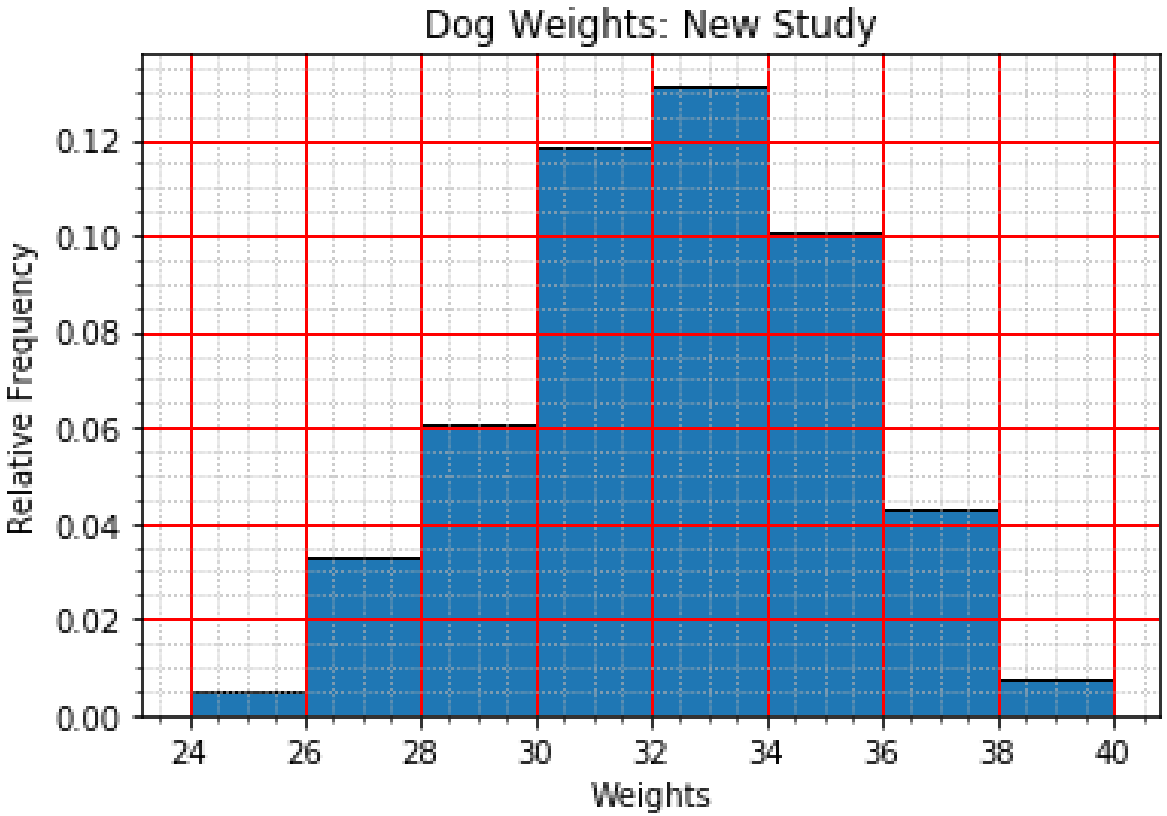
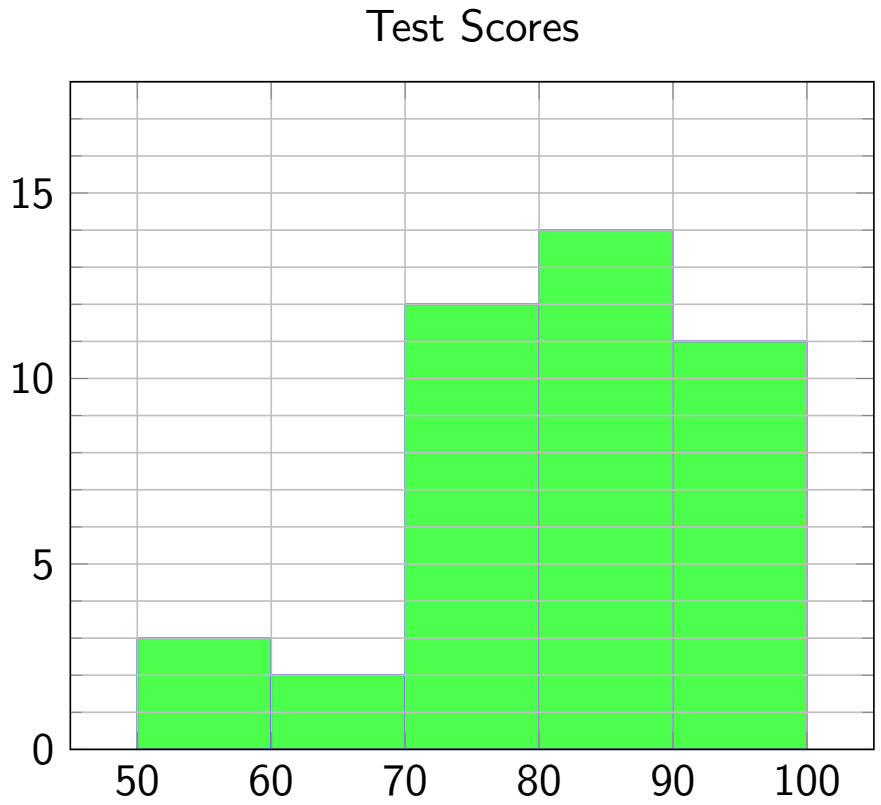


Example 1

Answer each given the histogram below.



(a) What is the class width?

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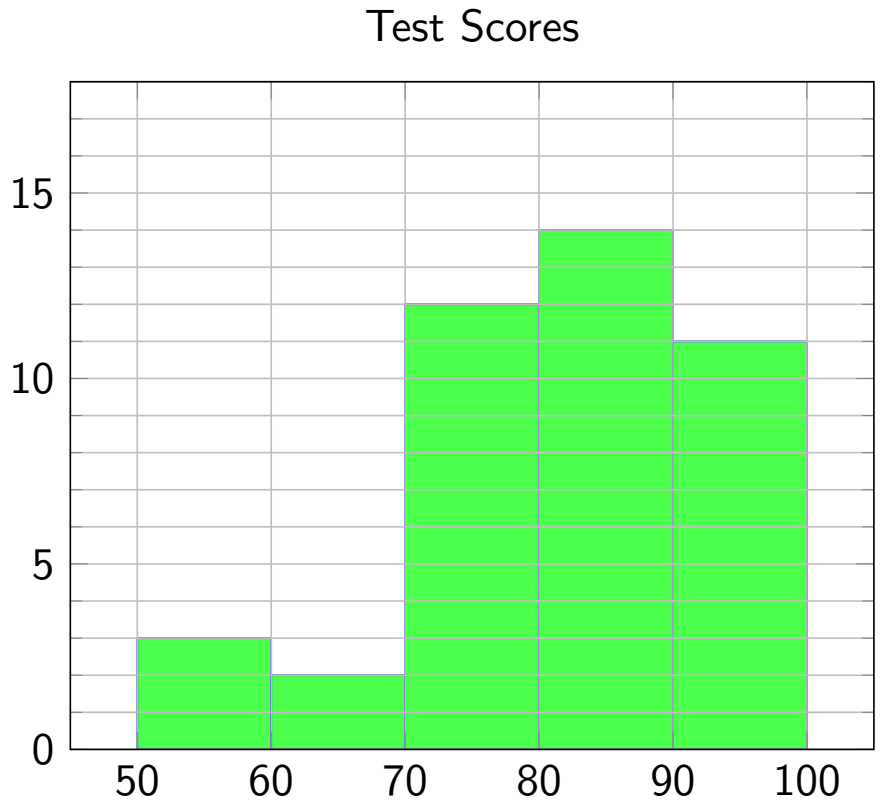
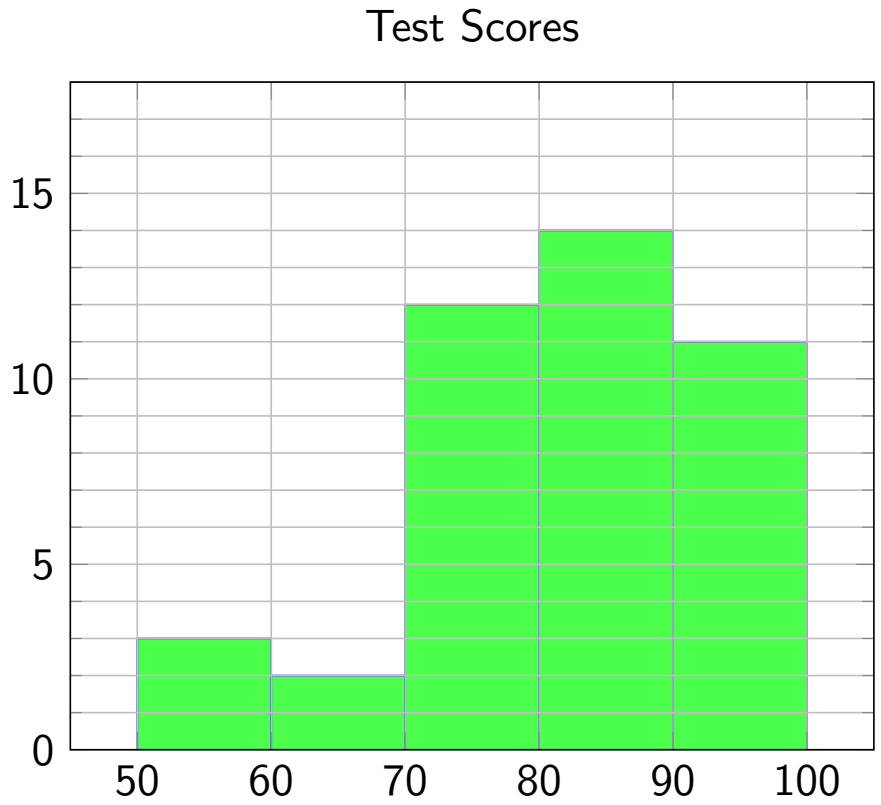


(a) What is the class width? 10

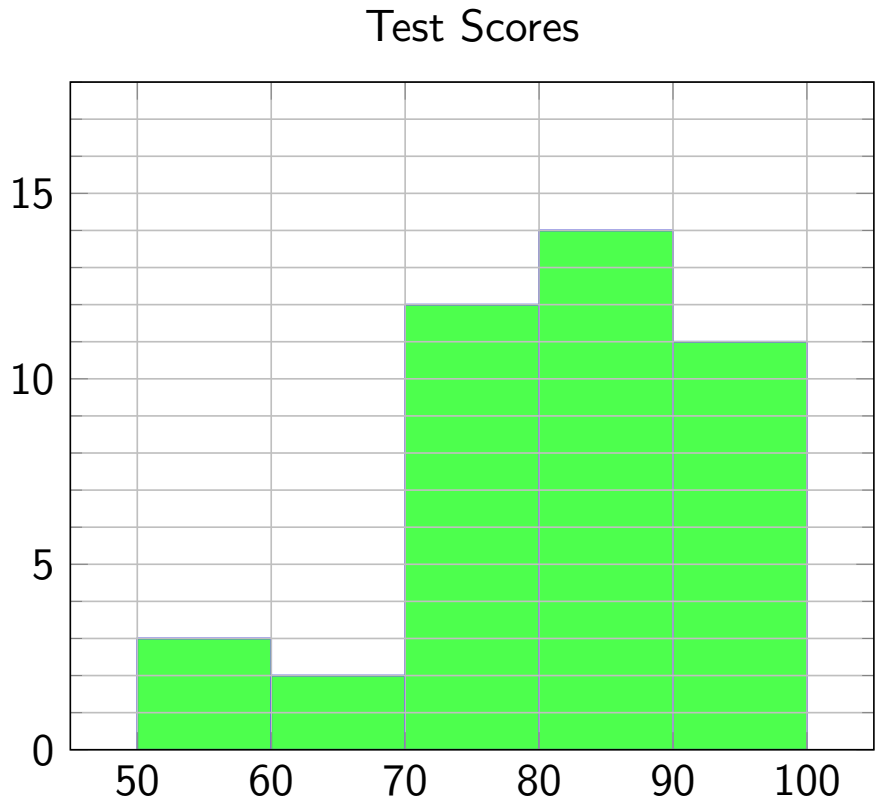
Example 1

(b) What is the class midpoint of the 4th class?



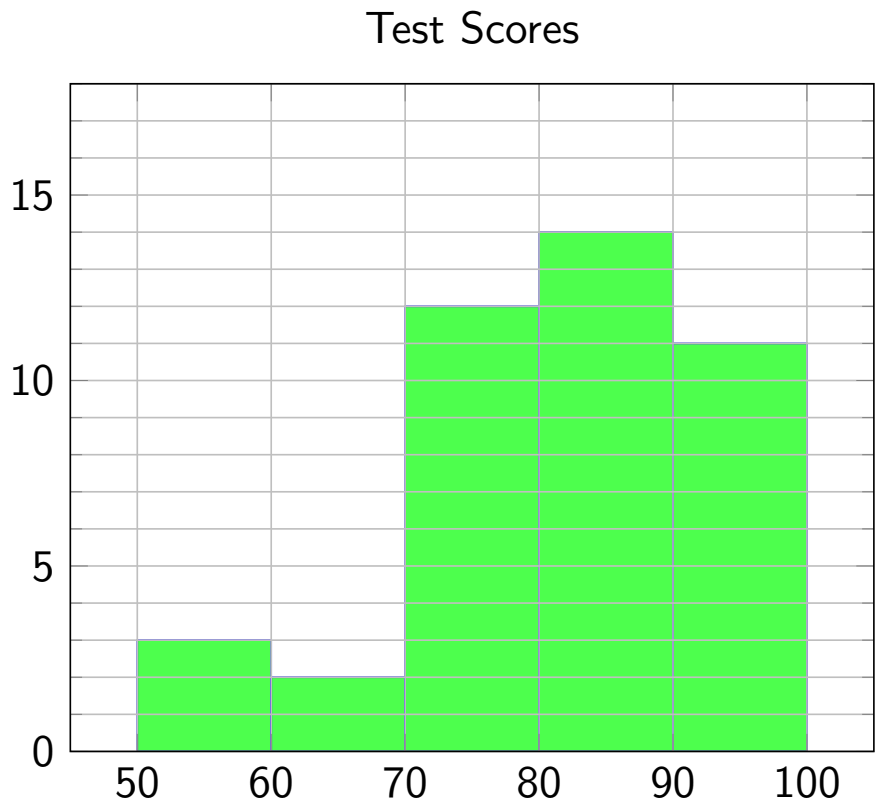
Example 1

(b) What is the class midpoint of the 4th class? 85



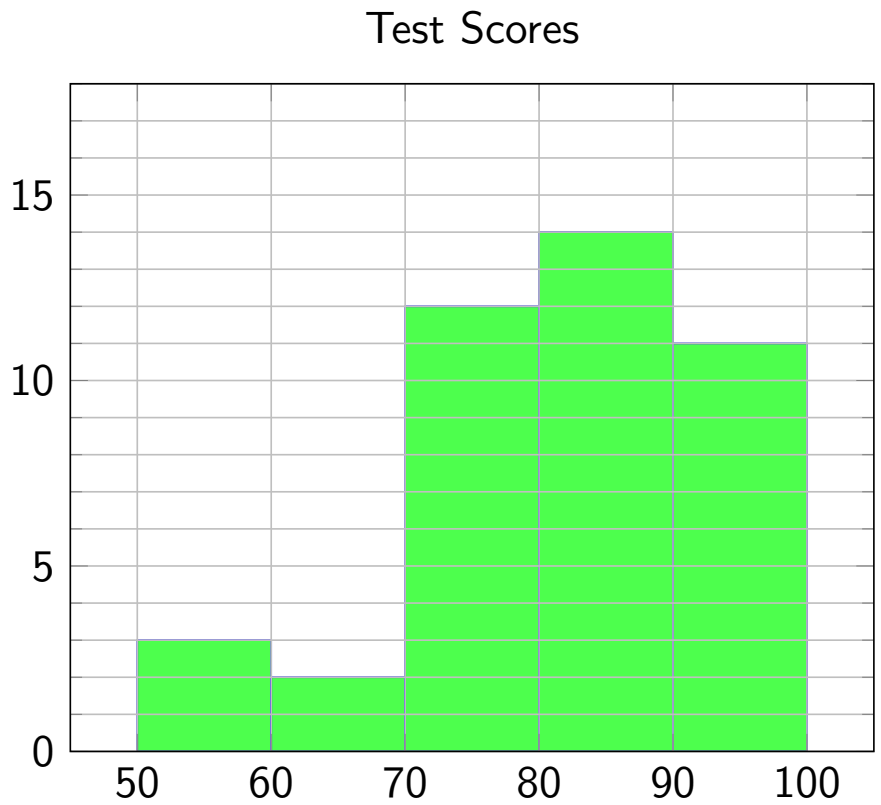
Example 1

(c) What are the class boundaries of the second class?



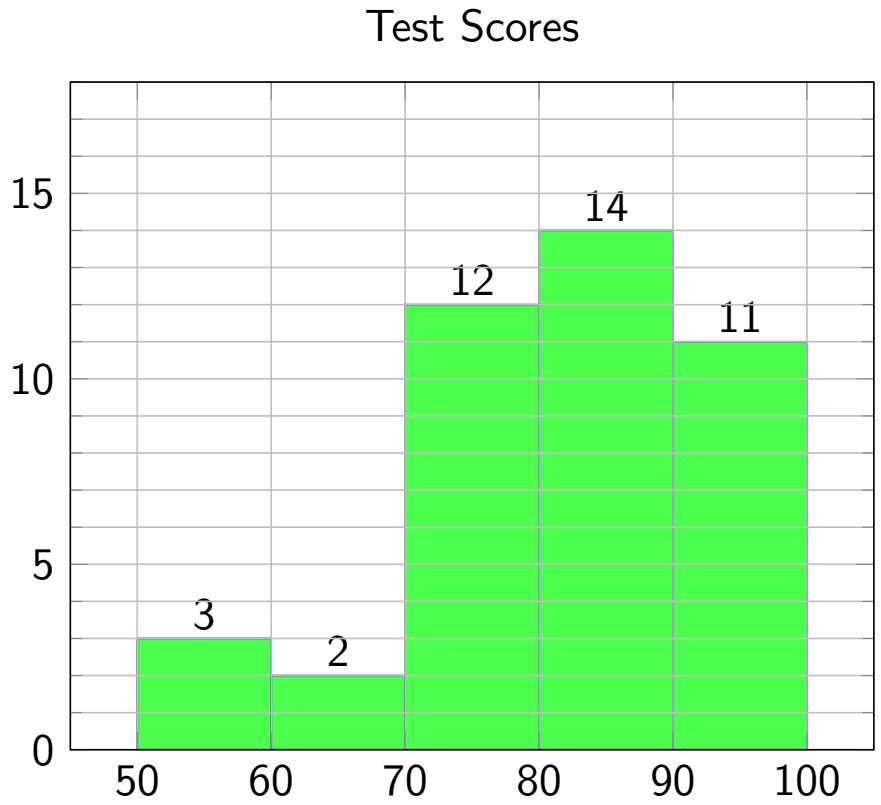
Example 1

(c) What are the class boundaries of the second class?
59.5 and 70.5



Example 1

(d) What is the relative frequency of the 5th class?



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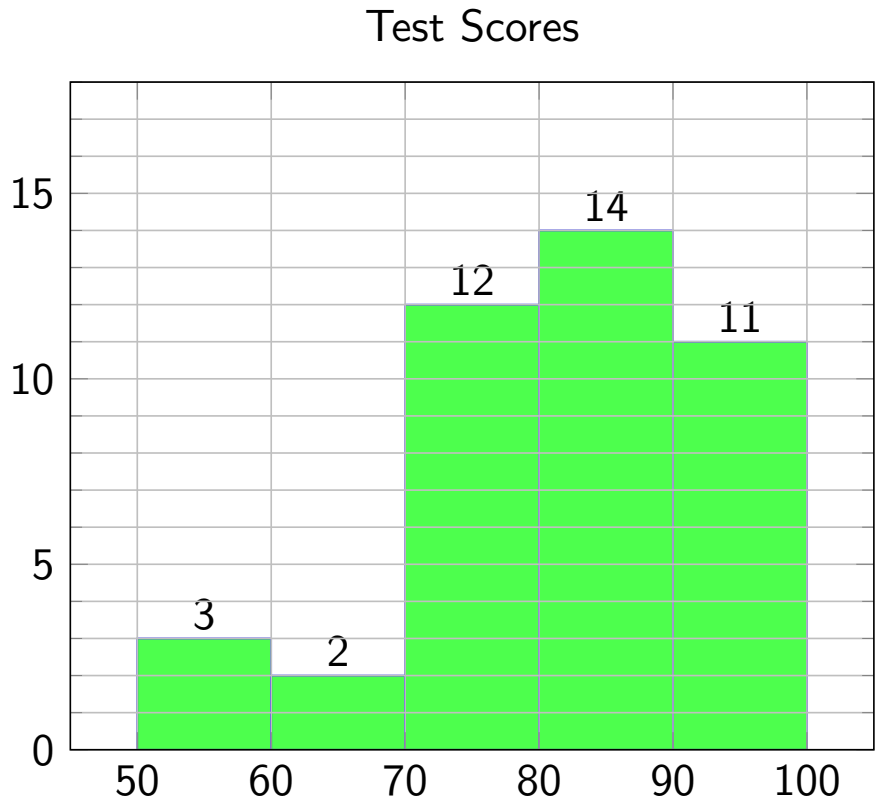
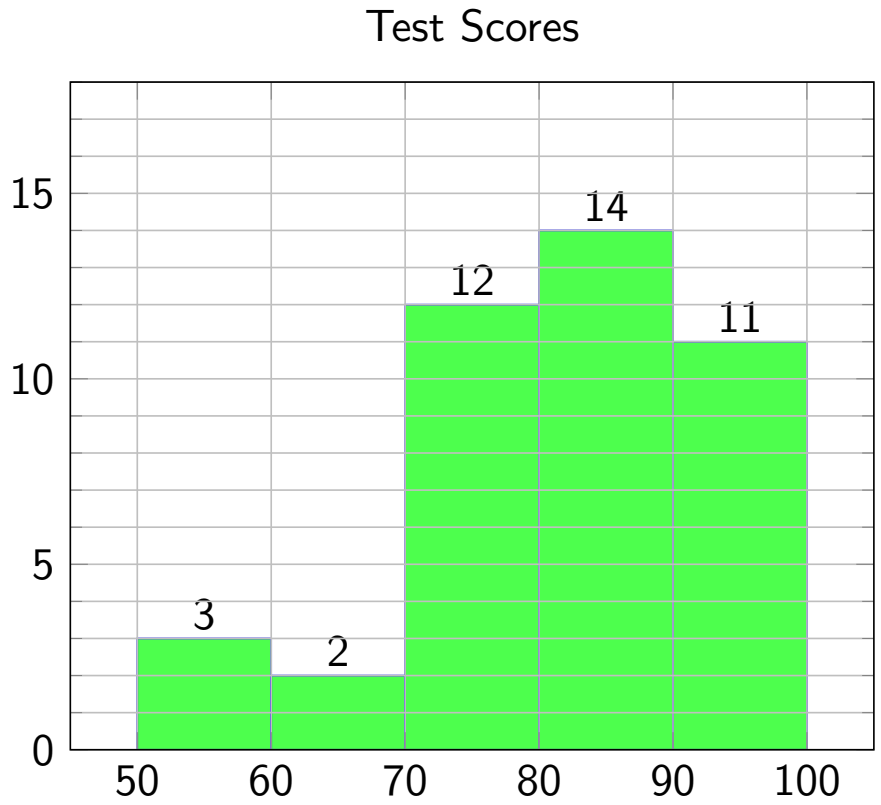


Example 1

(d) What is the relative frequency of the 5th class? 11/42



Example 2

Create a histogram from the measurements below. Use the minimum value as the lower class limit of the first class and use a class width of 2.

9	2	10	1	4
5	1	6	7	4
6	5	4	8	10
3	1	2	3	9
8	6	1	1	10

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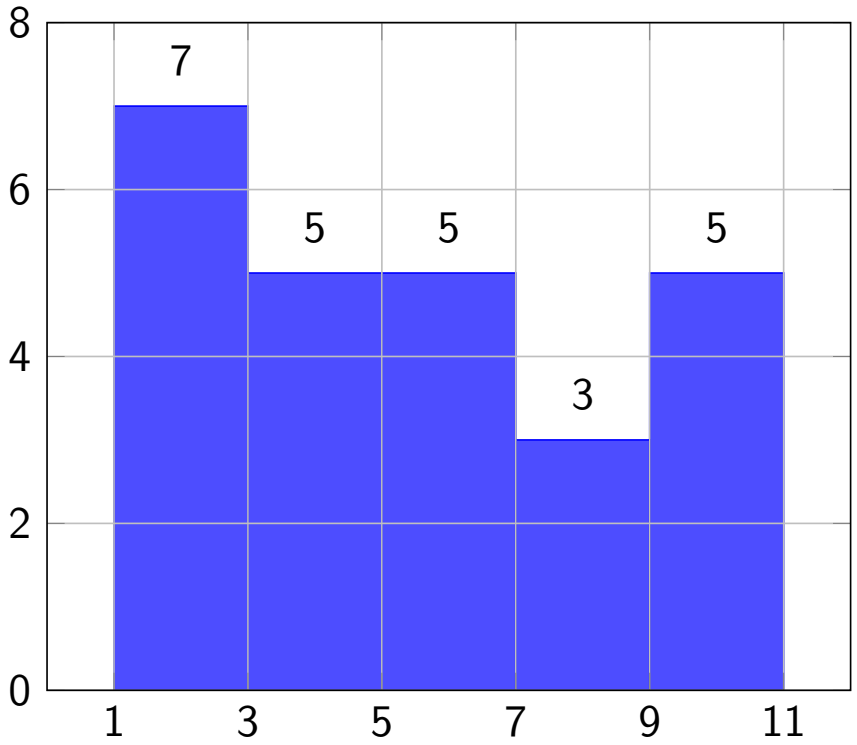
Use 1,3,5,7,9, and 11 as the lower class limits.

Example 2



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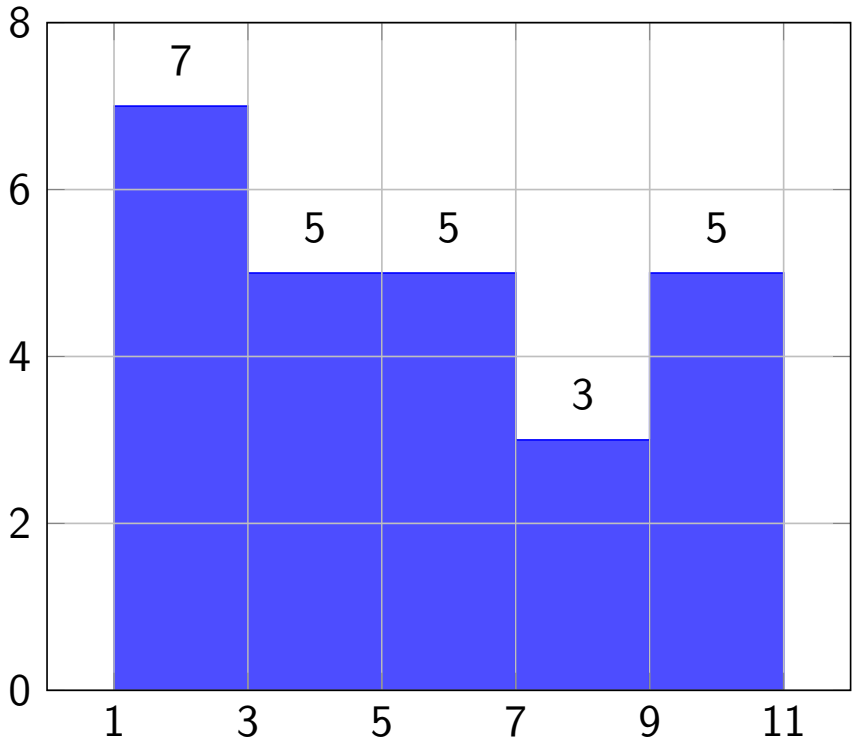
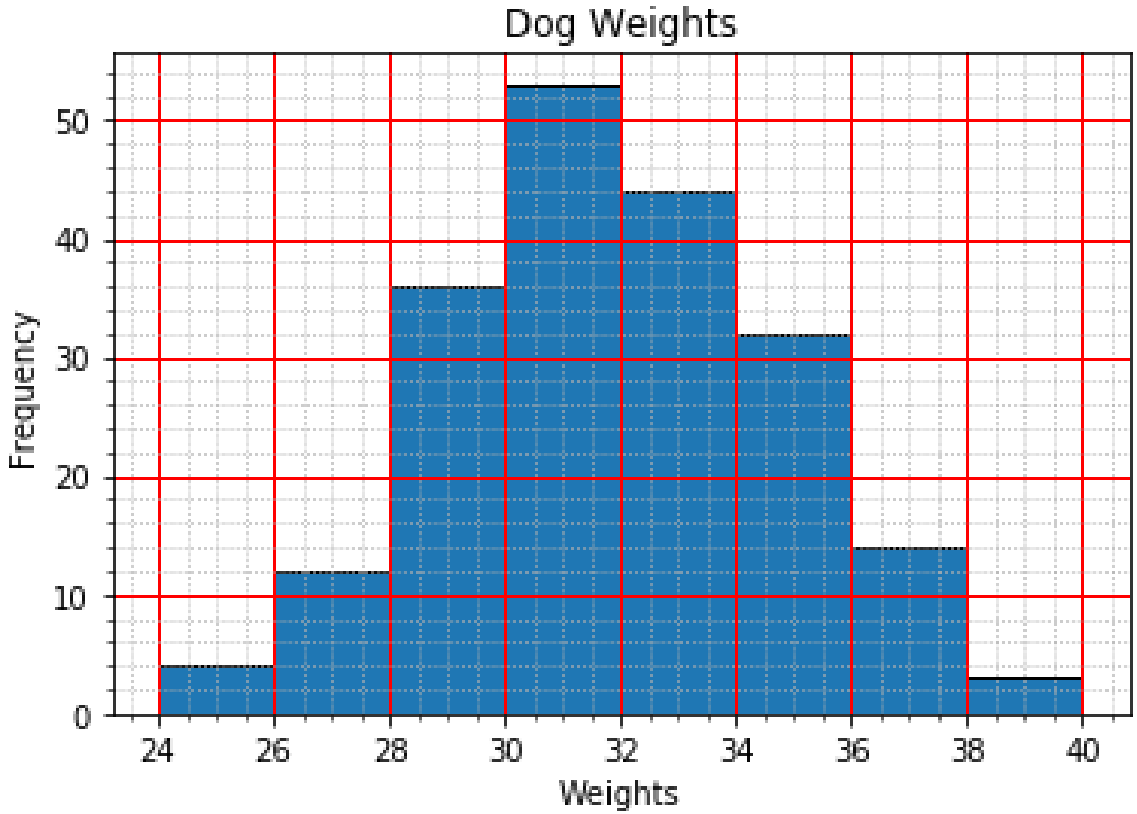


Example 3

(a) Given the histogram below of the weights of 200 dogs, find the total number of dogs whose weight is at least 34 pounds.



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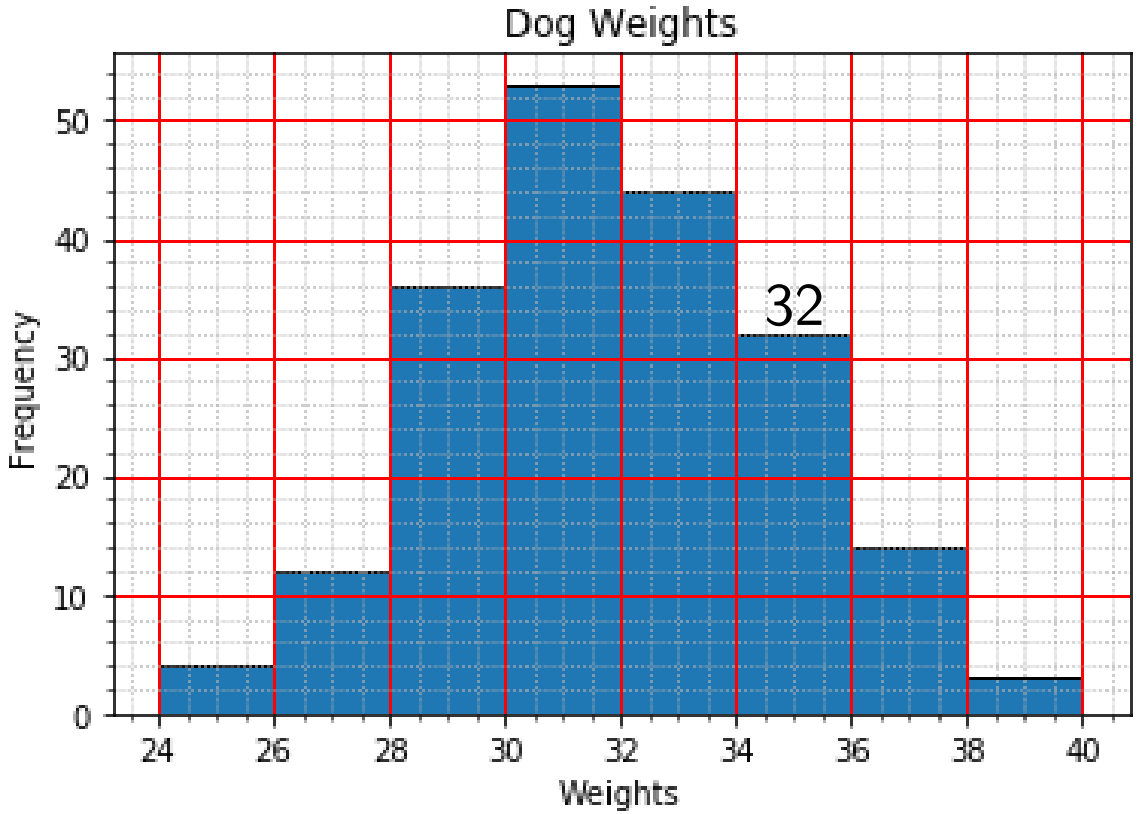

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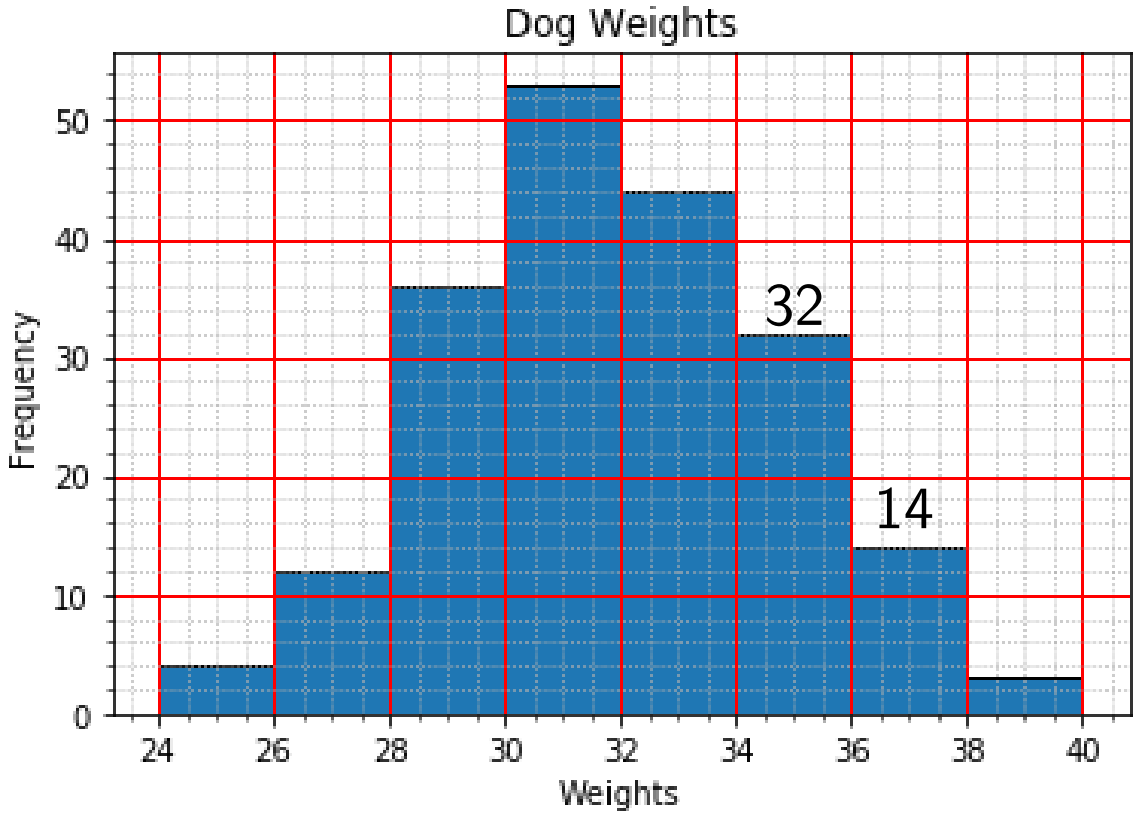

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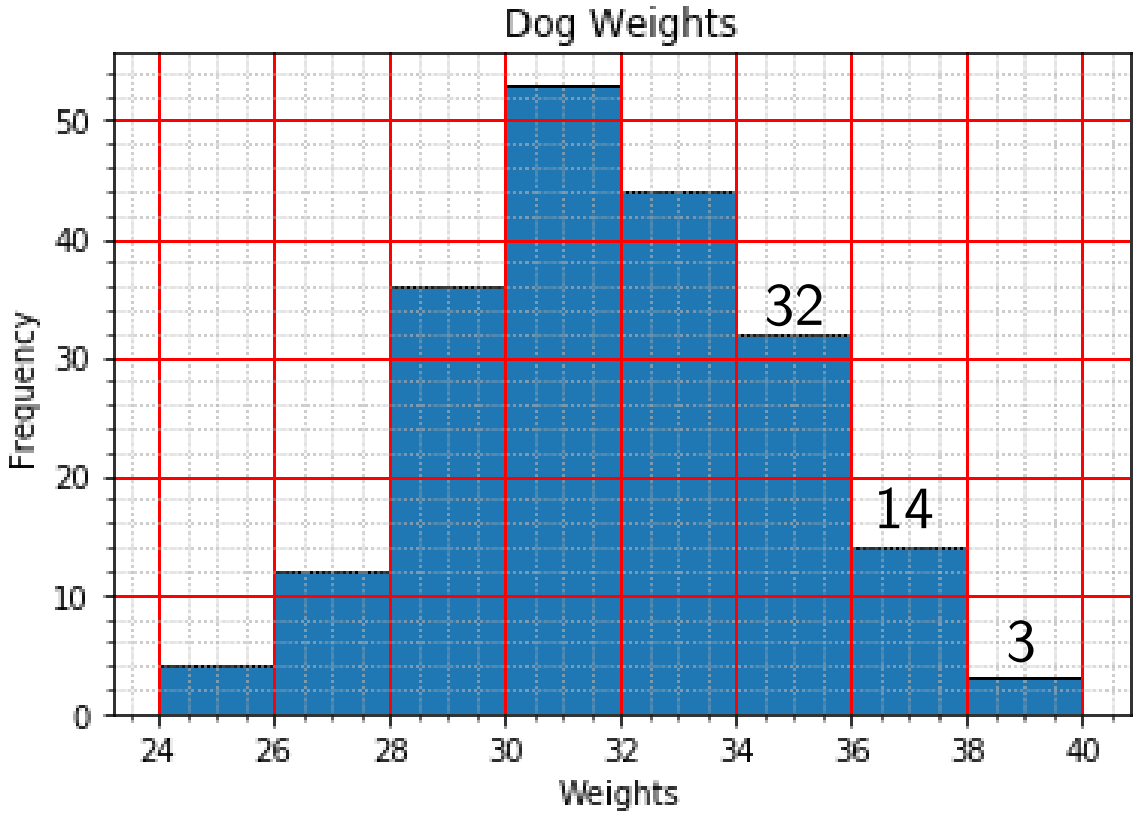

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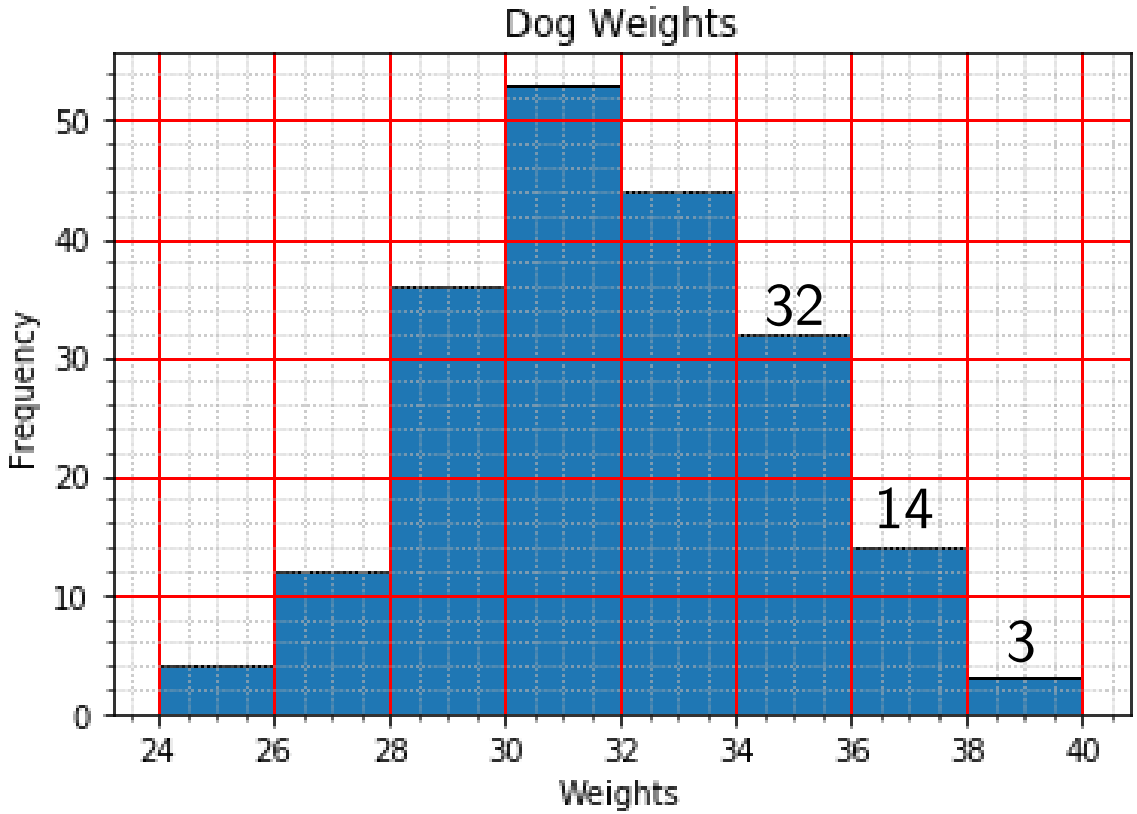
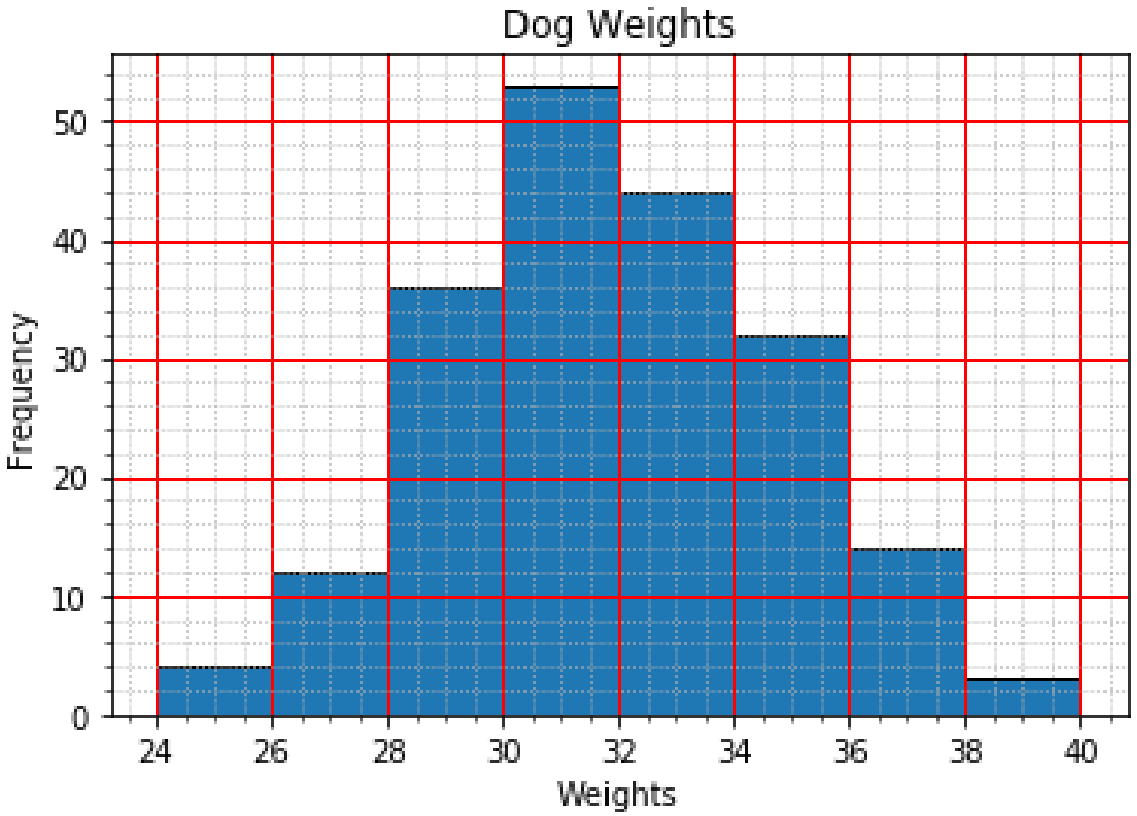


Total: 49

Example 3

(b) What percentage of the dogs have weights between 26 and 28 pounds?



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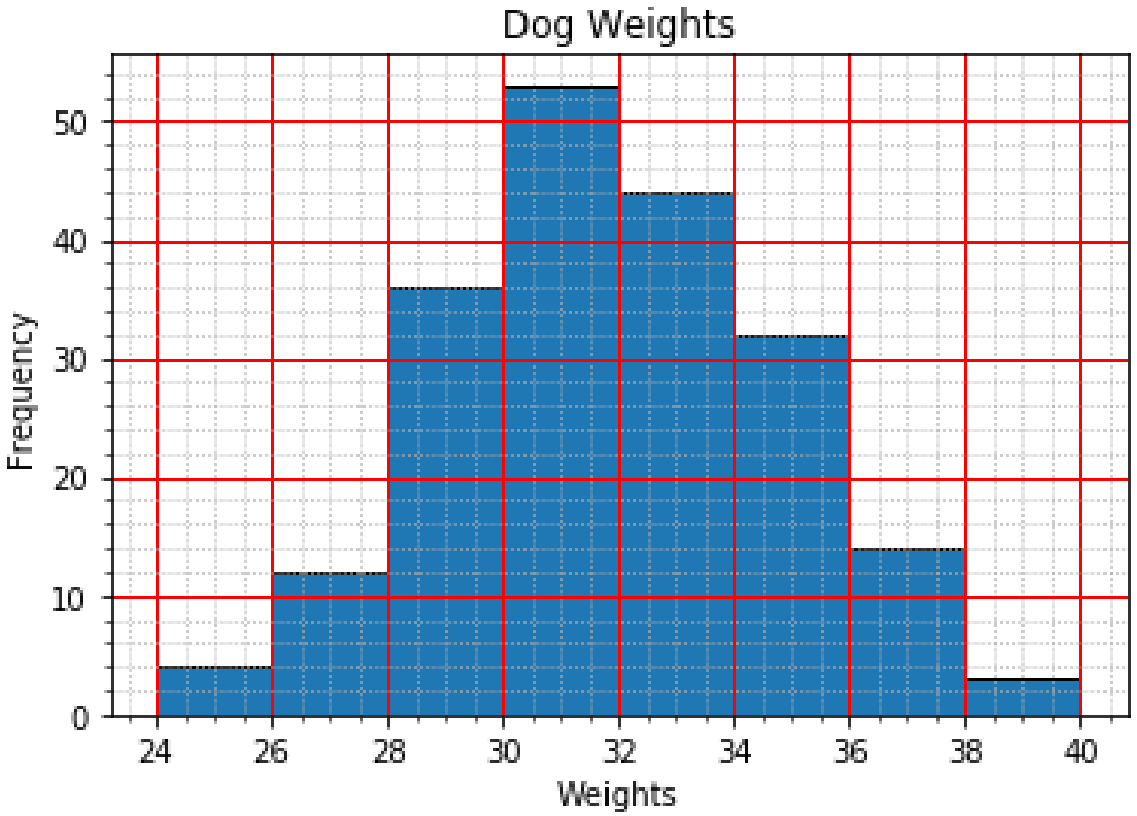

12/200

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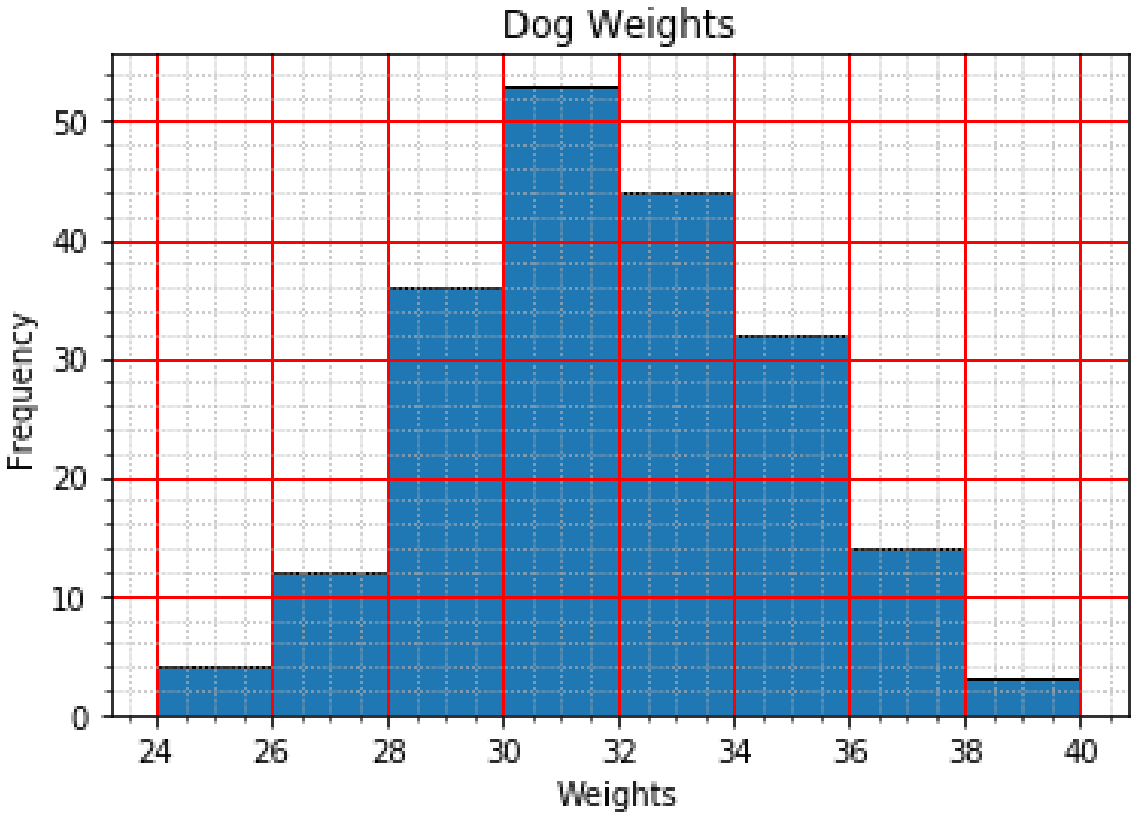
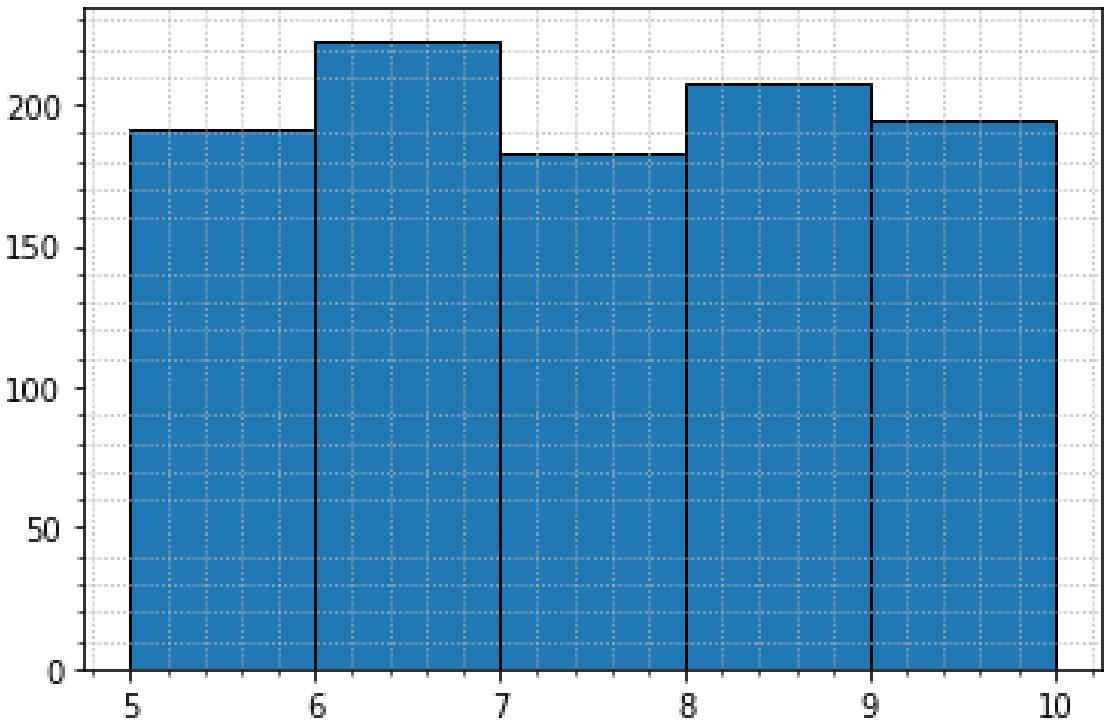


12/200

6%

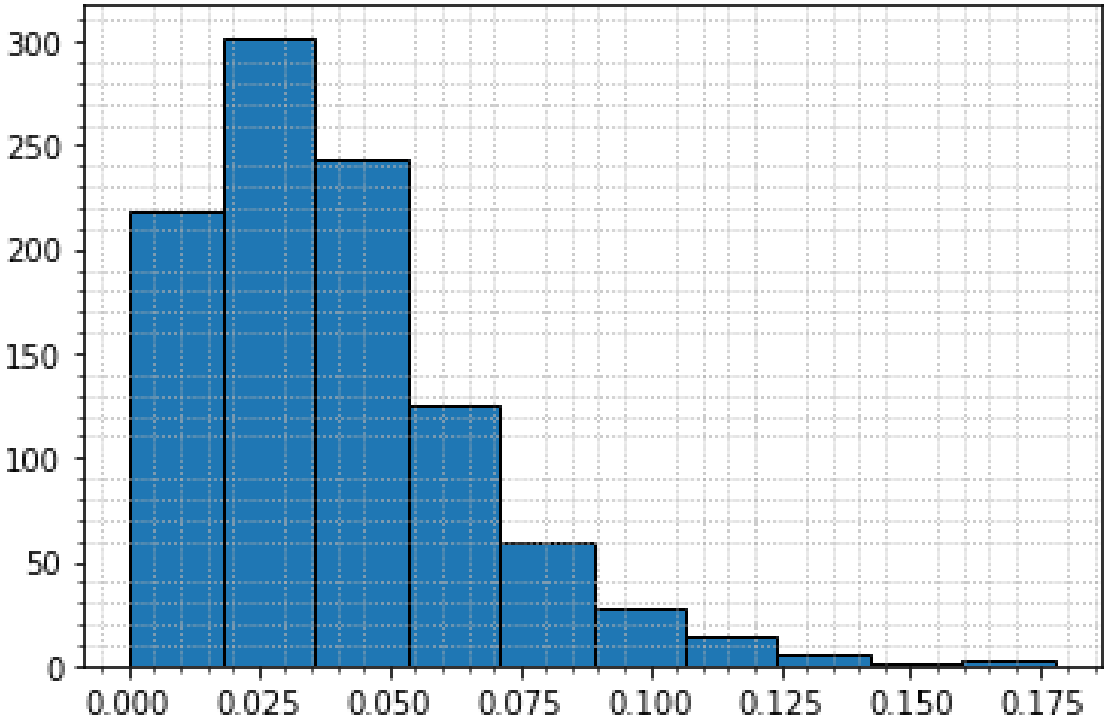
Some Common Histogram Shapes

Uniform distribution:



Some Common Histogram Shapes

Right (a.k.a. positively) skewed



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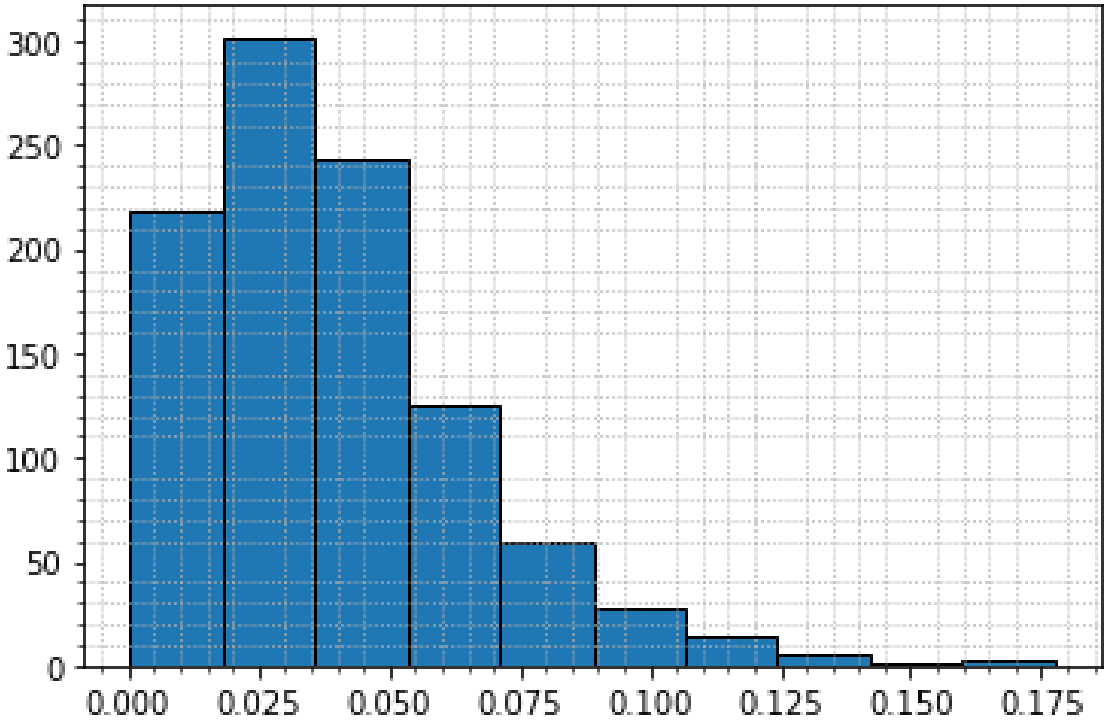
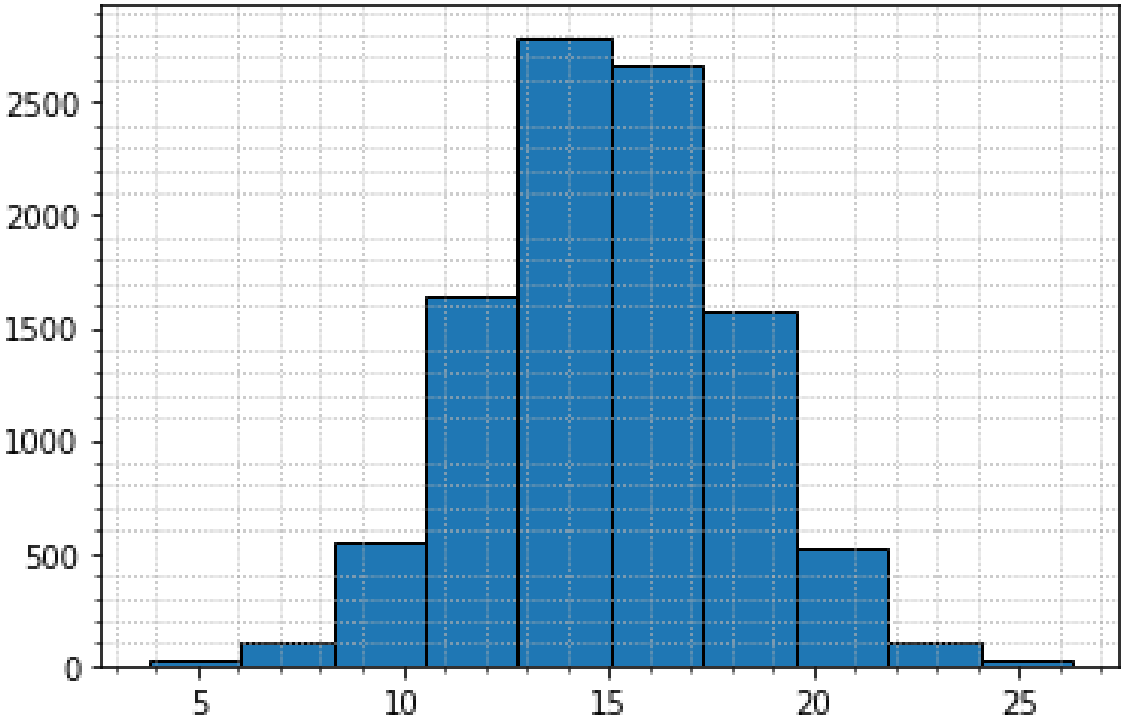


Note: Skewness refers to the tail

Some Common Histogram Shapes

Normal (a.k.a. bell-shaped)



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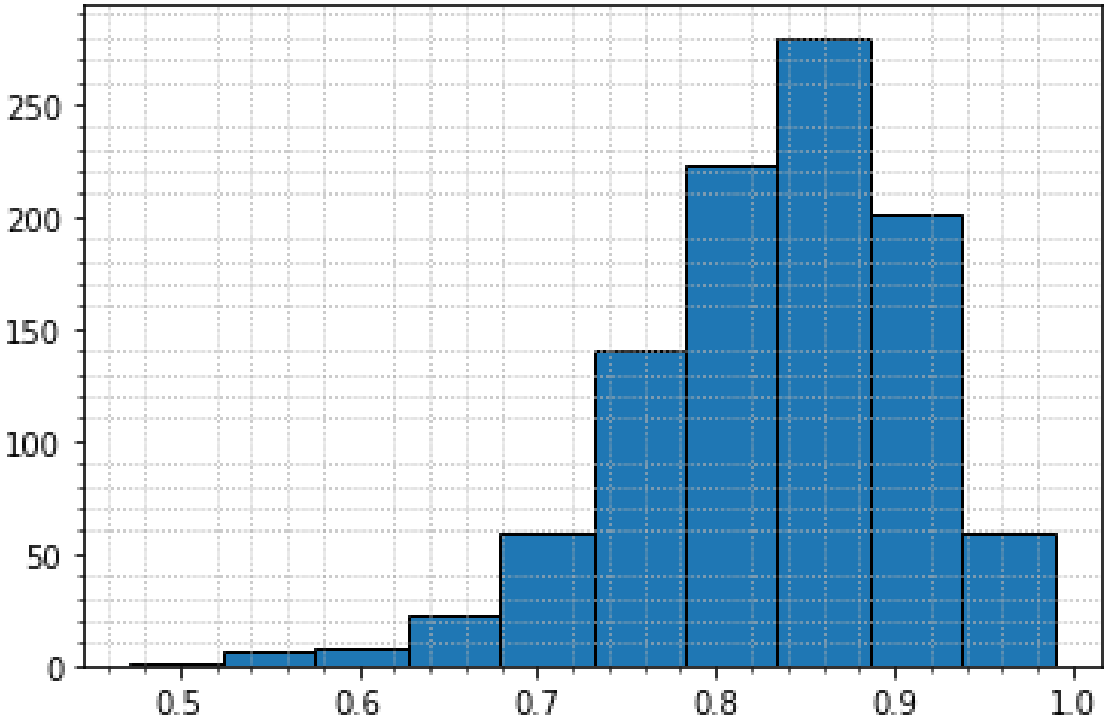
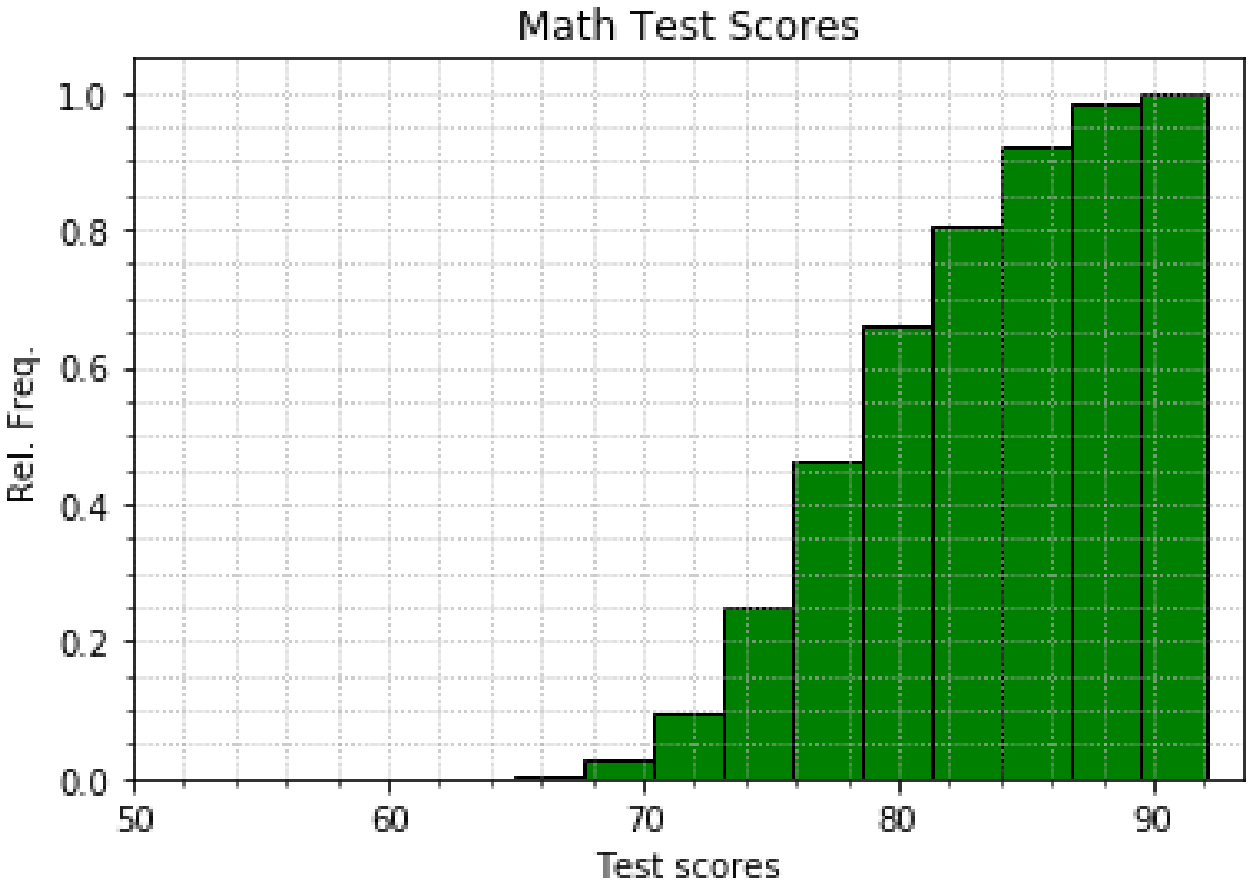


Cumulative Histogram Distributions

The cumulative relative frequency histogram below shows a running total of relative frequencies of scores for a mathemathics test.