Exercises 2–1

13. Favorite Coffee Flavor A survey was taken asking the favorite flavor of a coffee drink a person prefers. The responses were V = Vanilla, C = Caramel, M = Mocha, H = Hazelnut, and P = Plain. Construct a categorical frequency distribution for the data. Which class has the most data values and which class has the fewest data values?

V	C	P	P	M	M	P	P	M	C
M	M	V	M	M	M	V	M	M	M
P	V	C	M	V	M	C	P	M	P
M	M	M	P	M	M	C	V	M	C
C	P	M	P	M	H	H	P	H	P

Class	Tally	Frequency	Percent
V	𝍸 /	6	12
C	𝍸 //	7	14
M	𝍸 𝍸 𝍸 𝍸 //	22	44
H	///	3	6
P	𝍸 𝍸 //	12	24
	Total	50	100

The mocha flavor class the most data values and the hazelnut class has the least number of data values.

14. Trust in Internet Information A survey was taken on how much trust people place in the information they read on the Internet. Construct a categorical frequency distribution for the data. A = trust in all that they read, M = trust in most of what they read, H = trust in about one-half of what they read, S = trust in a small portion of what they read. (Based on information from the *UCLA Internet Report.*)

M	M	M	A	H	M	S	M	H	M
S	M	M	M	M	A	M	M	A	M
M	M	H	M	M	M	H	M	H	M
A	M	M	M	H	M	M	M	M	M

Trust Level	Frequency	Percent %
A	4	10
M	28	70
H	6	15
S	2	5
Total	40	100%

15. Eating at Fast Food Restaurants A survey was taken of 50 individuals. They were asked how many days per week they ate at a fast-food restaurant. Construct a frequency distribution using 8 classes (0–7). Based on the distribution, how often did most people eat at a fast-food restaurant?

1	3	4	0	4
5	2	2	3	1
2	2	2	2	2
2	2	2	2	3
2	2	5	2	4
2	4	5	2	1
4	1	3	2	2
2	0	7	2	3
2	2	2	5	2
3	3	4	1	3

class

~~Limits~~	Boundaries	Tally	f
0	−0.5–0.5	//	2
1	0.5–1.5	𝍸	5
2	1.5–2.5	𝍸 𝍸 𝍸 ////	24
3	2.5–3.5	𝍸 ///	8
4	3.5–4.5	𝍸 /	6
5	4.5–5.5	////	4
6	5.5–6.5		0
7	6.5–7.5	/	1
		Total	50

تكرار تراكمي

	cf
Less than −0.5	0
Less than 0.5	2
Less than 1.5	7
Less than 2.5	31
Less than 3.5	39
Less than 4.5	45
Less than 5.5	49
Less than 6.5	49
Less than 7.5	50

The category "twice a week" has more values than any other category.

16. Ages of Dogs The ages of 20 dogs in a pet shelter are shown. Construct a frequency distribution using 7 classes.

5	8	7	6	~~5~~
9	4	4	5	8
7	4	7	5	7
~~3~~	5	8	4	9

Class	Frequ	class boundar	percentag	CF
3	2	2.5-3.5	10	2 less
4	4	3.5-4.5	20	6
5	4	4.5-5.5	20	10
6	1	5.5-6.5	5	11
7	4	6.5-7.5	20	15
8	3	7.5-8.5	15	18
9	2	8.5-9.5	10	20
	20		100	

class	Class Boundaries	Frequency (f)	Cumulative Frequency (CF)	Less Than Upper Boundary
	—	0	0	Less than 2.5
3	2.5 - 3.5	2	2	Less than 3.5
4	3.5 - 4.5	4	6	Less than 4.5
5	4.5 - 5.5	4	10	Less than 5.5
6	5.5 - 6.5	1	11	Less than 6.5
7	6.5 - 7.5	4	15	Less than 7.5
8	7.5 - 8.5	3	18	Less than 8.5
9	8.5 - 9.5	2	20	Less than 9.5

17. Maximum Wind Speeds The data show the maximum wind speeds in miles per hour recorded for 40 states. Construct a frequency distribution using 7 classes.

59	78	62	72	67
76	92	77	64	83
64	70	67	75	75
78	75	71	72	93
68	69	76	72	85
64	70	77	74	72
53	67	48	76	59
87	53	77	70	63

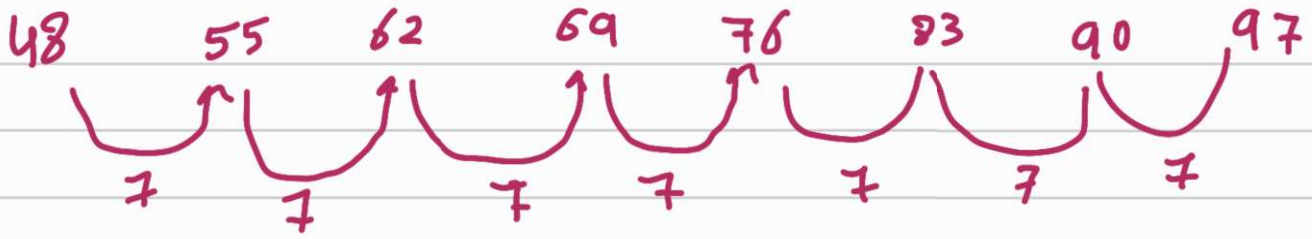
Source: NOAA

Max = 93

min = 48

Range = 93 − 48 = 45

$W = \frac{R}{k} = \frac{45}{7} = 6.4 = 7$



Class Interval	Class Boundaries	Frequency (f)	Cumulative Frequency (CF)	Less Than Upper Boundary
—	—	0	0	Less than 47.5
48 - 54	47.5 - 54.5	3	3	Less than 54.5
55 - 61	54.5 - 61.5	2	5	Less than 61.5
62 - 68	61.5 - 68.5	9	14	Less than 68.5
69 - 75	68.5 - 75.5	13	27	Less than 75.5
76 - 82	75.5 - 82.5	8	35	Less than 82.5
83 - 89	82.5 - 89.5	3	38	Less than 89.5
90 - 96	89.5 - 96.5	2	40	Less than 96.5

18. Stories in the World's Tallest Buildings The number of stories in each of a sample of the world's 30 tallest buildings follows. Construct a grouped frequency distribution and a cumulative frequency distribution with 7 classes.

88	88	110	88	80	69	102	78	70	55
79	85	80	100	60	90	77	55	75	55
54	60	75	64	105	56	71	70	65	72

Source: New York Times Almanac.

Range = 110 − 54 = 56

$$W = \frac{R}{K} = \frac{56}{7} = 8$$

54 62 70 78 86 94 102 110

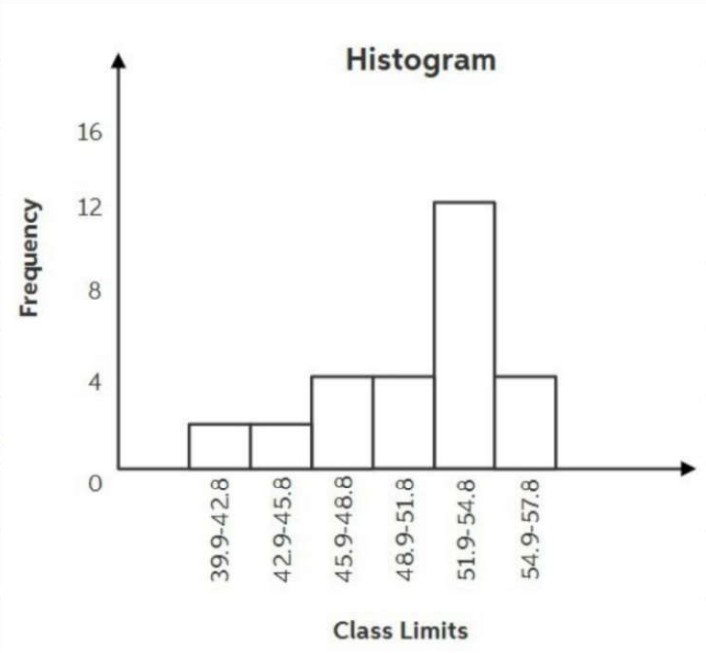
Class Interval	Class Boundaries	Frequency (f)	Cumulative Frequency (CF)	Cumulative Frequency (Less Than, CF<)
54 - 61	53.5 - 61.5	5	5	Less than 61.5 → 5
62 - 69	61.5 - 69.5	4	9	Less than 69.5 → 9
70 - 77	69.5 - 77.5	7	16	Less than 77.5 → 16
78 - 85	77.5 - 85.5	5	21	Less than 85.5 → 21
86 - 93	85.5 - 93.5	3	24	Less than 93.5 → 24
94 - 101	93.5 - 101.5	3	27	Less than 101.5 → 27
102 - 110	101.5 - 110.5	3	30	Less than 110.5 → 30

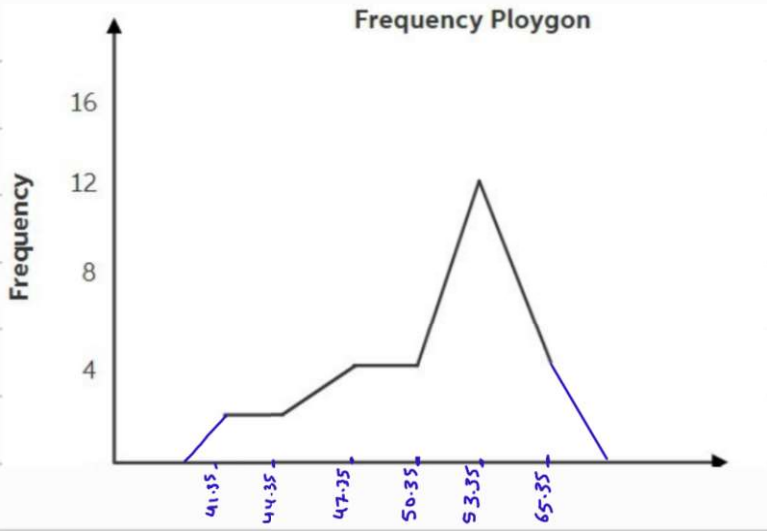
Exercises 2–2

6. NFL Salaries The salaries (in millions of dollars) for 31 NFL teams for a specific season are given in this frequency distribution.

Construct a histogram, a frequency polygon, and an ogive for the data; and comment on the shape of the distribution. (The data for this exercise will be used for Exercise 16 of this section.)

Class limits	Frequency	Midpoint
39.9–42.8	2	41.35
42.9–45.8	2	44.35
45.9–48.8	5	47.35
48.9–51.8	5	50.35
51.9–54.8	12	53.35
54.9–57.8	5	56.35
	Total 31	59.35

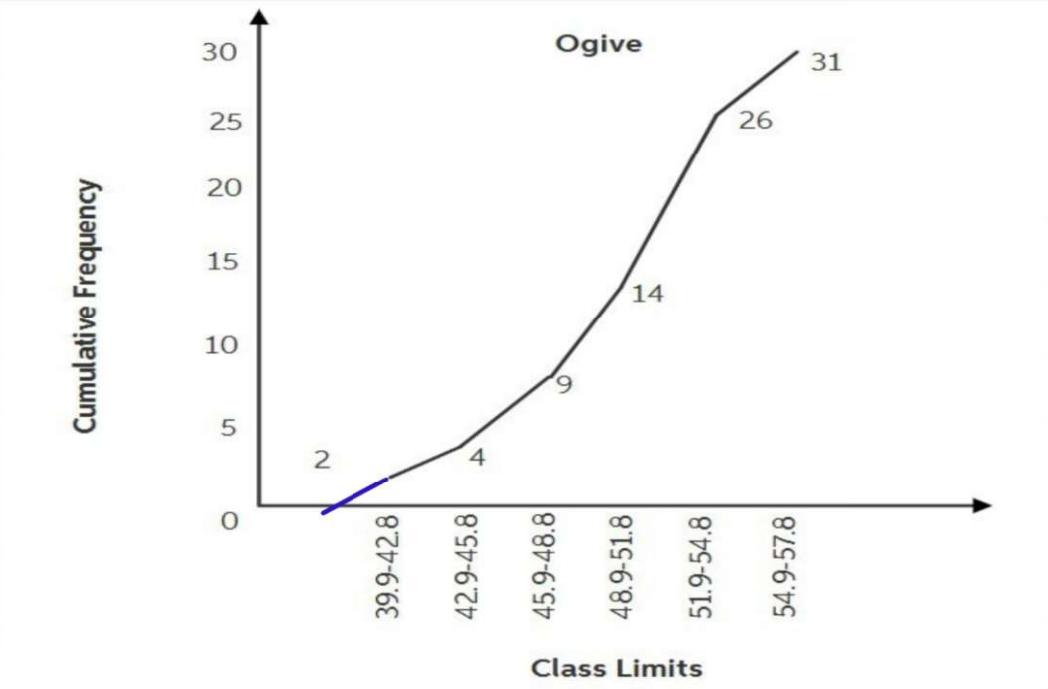




Since it is Observed that the Hisogram Follows Negative skew or left skew distribution

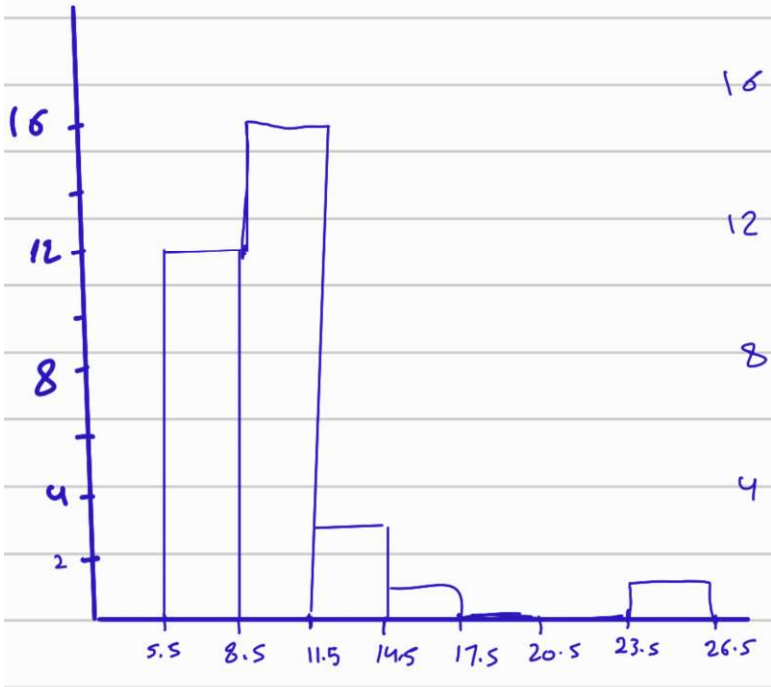
Ogive

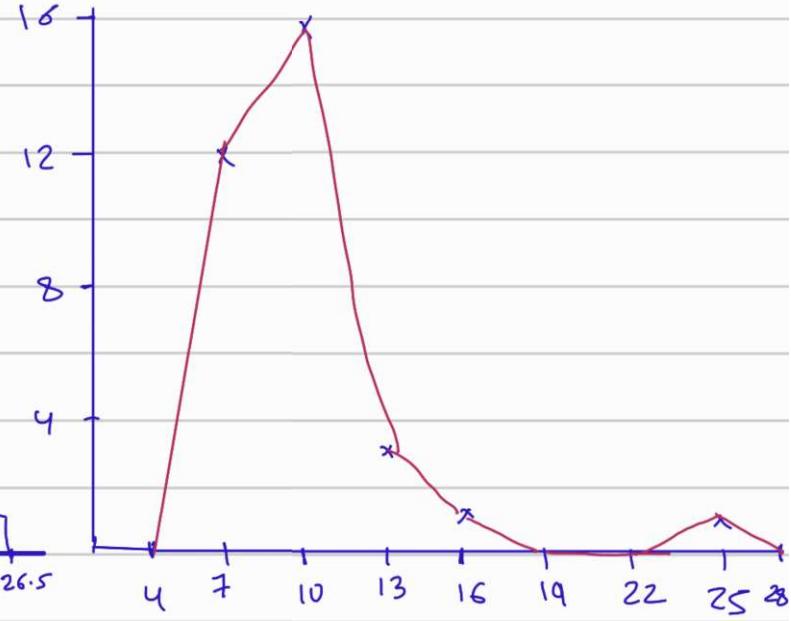
Class Limits	Frequency	Cumulative Frequency
39.9-42.8	2	2
42.9-45.8	2	4
45.9-48.8	5	9
48.9-51.8	5	14
51.9-54.8	12	26
54.9-57.8	5	31



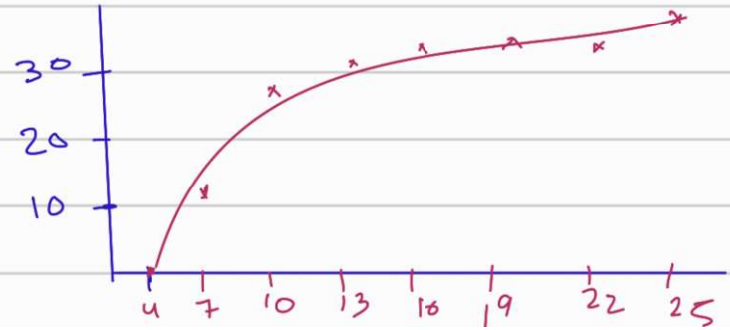
8. Costs of Utilities The frequency distribution represents the cost (in cents) for the utilities of states that supply much of their own power. Construct a histogram, frequency polygon, and ogive for the data. Is the distribution skewed?

Class limits	Frequency	Class boundary	Mid point	CF
			4	0
6–8	12	5.5–8.5	7	12
9–11	16	8.5–11.5	10	28
12–14	3	11.5–14.5	13	31
15–17	1	14.5–17.5	16	32
18–20	0	17.5–20.5	19	32
21–23	0	20.5–23.5	22	32
24–26	1	23.5–26.5	25	33
	Total 33			





Positive Skewed



9. Air Pollution One of the air pollutants that is measured in selected cities is sulfur dioxide. This pollutant occurs when fossil fuels are burned. This pollutant is measured in micrograms per cubic meter ($\mu g/m^3$). The results obtained from a sample of 24 cities are shown in the frequency distributions. One sample was taken recently, and the other sample of the same cities was taken 5 years ago. Construct a histogram and compare the two distributions.

Class limits	Frequency (now)	Frequency (5 years ago)
10–14	6	5
15–19	4	4
20–24	3	2
25–29	2	3
30–34	5	6
35–39	1	2
40–44	2	1
45–49	1	1
	Total 24	Total 24

Limits	Boundaries	*f* (now)	*f* (5 years ago)
10–14	9.5–14.5	6	5
15–19	14.5–19.5	4	4
20–24	19.5–24.5	3	2
25–29	24.5–29.5	2	3
30–34	29.5–34.5	5	6
35–39	34.5–39.5	1	2
40–44	39.5–44.5	2	1
45–49	44.5–49.5	1	1
		Total 24	Total 24