

Chapter 2—Frequency Distribution and Tables

Additional Questions

1. What is the most appropriate number of class intervals for scores ranging from 21 to 85?
 - a. 3
 - b. 4
 - c. 5
 - d. 6
2. The first interval in a frequency distribution conventionally begins with what number?
 - a. An even number
 - b. An odd number
 - c. A number lower than the lowest score in the distribution
 - d. Lowest score in the distribution
 - e. Multiple of the size of the class interval
3. In general, what class interval size is best for a range of scores from 72 through 136?
 - a. 3
 - b. 4
 - c. 5
 - d. 6
4. What value is represented at the top of a cumulative frequency column?
 - a. N
 - b. $N - 1$
 - c. $N + 1$
 - d. 100%
 - e. None of the above
5. Which of the following indicates the most favorable rank?
 - a. 2nd out of 4
 - b. 3rd out of 5
 - c. 4th out of 10
 - d. 5th out of 15
6. What percentage of cases lies between the first and third quartiles?
 - a. 20%
 - b. 25%
 - c. 50%
 - d. 75%
 - e. Percentage varies
7. What is the midpoint of a class interval of 10–19?
 - a. 14
 - b. 15
 - c. 14.5
 - d. 15.5

8. Indicate the best class interval size for the following ranges.

- | | | | |
|-----------|----|----|----|
| a. 1–45 | 3 | 4 | 5 |
| b. 72–136 | 3 | 4 | 5 |
| c. 42–237 | 13 | 14 | 15 |

Short Answer

9. List the class boundaries for score limits of 18–19. _____ to _____
10. Identify the midpoint of a class interval of 18–19. _____
11. Score limits are 21–23. List the class boundaries. _____ to _____
12. Score limits are 21–23. List the midpoint of the interval. _____
13. Is it easier to work with an even number or odd number class interval size? even odd
14. What effect does a large class interval size have on scores in a frequency distribution?

True-False

- | | | |
|---|---|---|
| 15. If 10 score points separate the 70th and 80th percentiles, then 10 score points separate each decile level. | T | F |
| 16. For class sizes above 15, the preferred rule is to use a higher multiple. | T | F |
| 17. The third quartile is the same as the 75th centile. | T | F |
| 18. The 70th centile indicates the score above which 70% of cases fall. | T | F |
| 19. A frequency percentage is equal to relative frequency multiplied by 100. | T | F |
| 20. A complex table is preferable to a simple table. | T | F |
| 21. Abbreviations and acronyms facilitate interpretation of a table. | T | F |
| 22. All tables should have a title. | T | F |
| 23. Relative frequency and frequency percentage are only computed for qualitative data. | T | F |
| 24. Equal class widths are preferred to unequal class widths. | T | F |
| 25. A percentile score and a percentile rank refer to the same thing. | T | F |
| 26. A range is a category into which a score can be placed. | T | F |
| 27. Percentile scores are equally divided up and down a percentile scale. | T | F |

28. A medical terminology instructor surveys a class of 50 students regarding their class status: freshman (F), sophomore (So), junior (J), senior (Sr). The results are:

F So Sr J So So J So J Sr So F So So J J So F
 J So J So So So F J So J So J F So J Sr So J J
 So Sr J So J So F So F So So J J

Construct a frequency distribution including relative frequency and frequency percentage columns.

29. A medical center decided to track discharges. The choices included: H (home); AC (another acute care facility); NH (nursing home); HH (home health); Hos (hospice); Rehab (inpatient); and E (expired). Discharges include:

H HH Hos NH H H AC H Rehab H NH Hos H NH H
 H H NH E Rehab AC Hos HH NH AC H Rehab E HH
 Rehab AC HH NH H Rehab H NH AC H Rehab H H NH
 Hos H H NH HH H NH H H H HH HH

Construct a frequency distribution including relative frequency and frequency percentage columns.

30. The cancer registrar recorded the age (at the time of initial diagnosis) of patients diagnosed with lung cancer. A total of 80 cases were recorded. The ages are ranked from oldest to youngest.

91 86 83 82 81 80 80 79 78 77 76 75 75 74 74 73 72
 72 72 71 71 70 70 70 70 69 69 68 68 67 67 67 66 66 66
 66 66 65 65 65 64 64 63 63 62 62 61 61 61 60 60 59 59
 59 58 58 57 57 57 56 56 55 54 53 53 52 51 49 48 47 46
 45 44 42 40 39 38 35 29

- Construct a frequency distribution table with the lowest interval score limits of 25–29. Include the following columns:
 - Midpoint
 - Frequency
 - Cumulative frequency
 - Relative frequency
 - Frequency percentage
- Determine the value for:
 - 1st decile
 - 3rd decile
 - 65th percentile
 - 85th percentile
 - Percentile for an age of 48
 - Average age at time of diagnosis

CHAPTER 2—Frequency Distribution and Tables

- c Rationale: See definition of class interval.
- e Rationale: See definition of frequency distribution.
- c Rationale 5 would be the most appropriate size for this range.
- a c Rationale See definition of cumulative frequency column.
- d c Rationale the rank of 5th of 15 is most favorable because there is a larger group to be compared to.
- c Rationale: See definition of quartiles

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7. c Rationale: $19-10 = 9/2 = 4.5$ add 4.5 to the lowest number in the range, which is 10. $10 + 4.4 = 14.5$
8. a. 3 b. 5 c. 15 Rationale for a, b and c. See definition of class interval size.
9. 17.5 to 19.4 Rationale: The class boundaries are .50 below the lowest score and .040 above the highest score, which would be 17.5 and 19.4
10. 18.5 Rationale: The midpoint between 19 = 19 is 18.5
11. 20.5 to 23.4 Rationale: The class boundaries are .50 below the lowest score and .040 above the highest score, which is 20.5 and 23.4
12. 22 Rationale: The midpoint between 21–23 is 22.
13. Odd Rationale: See definition of class interval.
14. Tends to obliterate individual scores Rationale: See definition of class interval.
- 15–27: F Rationale: See definition of percentiles T T F Rationale: See definition of centile. T F Rationale: See definition of table F Rationale: See definition of tables T F Rationale: Relative: Frequency is computed for both quantitative and qualitative data T F Rationale: Percentile score and percentile ranks are not interchangeable. T F See definition of percentile
28. fresh, 7/50, 14%; Rationale: There are 7 freshman out of 50 students, the frequency percentage is $7/50 \times 100 = 14\%$ soph, 22/50, 44%; Rationale: There are 22 Sophomore out of 50 students, the frequency percentage is $22/50 \times 100 = 44\%$ junior, 17/50, 34%; Rationale: There are 17 Juniors out of 50 students, the frequency percentage is $17/50 \times 100 = 34\%$ senior, 4/50, 8% Rationale: There are 24 Seniors out of 50 students, the frequency percentage is $4/50 \times 100 = 8\%$.
29. home, 21/55, 38.18% Rationale: There are 21 home discharges out of 55 total discharge patients, the frequency percentage is $21/55 \times 100 = 38.18\%$; AC, 5/55, 9.09%; Rationale: There are 5 another acute care facility discharges out of 55 total patient discharges, the frequency percentage is $5/55 \times 100 = 9.09\%$ NH, 10/55, 18.18% Rationale: There are 10 nursing home discharges out of 55 total patient discharges, the frequency percentage is $10/55 \times 100 = 18.18\%$; HH, 7/55, 12.73% Rationale: There are 7 home health discharges out of 55 total patient discharge, the frequency percentage is $7/55 \times 100 = 12.73\%$; hos, 4/55, 7.27% Rationale: There are 4 Hospice out of 55 total patient discharges, the frequency percentage is $4/55 \times 100 = 7.27\%$; rehab, 6/55, 10.91% Rationale: There are 6 rehab discharges out of 55 total patient discharges, the frequency percentage is $6/55 \times 100 = 10.91\%$ 4% ; exp, 2/55, 3.64% Rationale: There are 2 expired out of 55 total patient discharges the frequency percentage is $2/55 \times 100 = 3.64\%$.
30. a. Rational See frequency distribution guidelines ungrouped grouped
- b. (90–45) Rationale: $80 \times 10 = 800$, the 8th position is 45 Rationale: $80 \times 10 = 800$, the 8th position is 45
 (23–58) Rationale: $80 \times 30 = 2400$, the 24th position is 58 Rationale: $80 \times 30 = 2400$, the 24th position is 58
 (80–68) Rationale: $85 \times 80 = 6800$, the 68th position is 69 Rationale: $85 \times 80 = 6800$, the 68th position is 69
 (53–135) Rationale: $85 \times 100 = 8500$, the 85th position is 135 Rationale: $85 \times 100 = 8500$, the 85th position is 135
 (60–64) years of age Rationale: $80 \times 10 = 800$, the 6th position is 64 Rationale: $80 \times 10 = 800$, the 6th position is 64
- | score limits | f | midpt | cf | rel. f | freq. % |
|--------------|----|-------|----|--------|---------|
| 90–99 | 1 | 94.5 | 1 | 0.0125 | 1.25 |
| 80–89 | 3 | 84.5 | 4 | 0.0375 | 3.75 |
| 70–79 | 5 | 74.5 | 9 | 0.0625 | 6.25 |
| 60–69 | 8 | 64.5 | 17 | 0.1000 | 10.00 |
| 50–59 | 10 | 54.5 | 27 | 0.1250 | 12.50 |
| 40–49 | 12 | 44.5 | 39 | 0.1500 | 15.00 |
| 30–39 | 15 | 34.5 | 54 | 0.1875 | 18.75 |
| 20–29 | 11 | 24.5 | 65 | 0.1375 | 13.75 |
| 10–19 | 11 | 14.5 | 76 | 0.1375 | 13.75 |
| 0–9 | 5 | 4.5 | 81 | 0.0625 | 6.25 |
| 45–49 | 5 | 47 | 12 | 0.0625 | 6.25 |
| 40–44 | 3 | 42 | 7 | 0.0375 | 3.75 |
| 35–39 | 3 | 37 | 4 | 0.0375 | 3.75 |
| 30–34 | 0 | 32 | 1 | ----- | ----- |
| 25–29 | 1 | 27 | 1 | 0.0125 | 1.25 |
1. a. Construct a qualitative frequency distribution and include a frequency column, relative frequency column and frequency percentage column

CHAPTER 2 Frequency and Distribution Tables

Relative Frequency and Percentage Frequency		
Patient Satisfaction Survey		
Rating	Relative Frequency	Frequency Percentage
Excellent	$28/75 = 0.373$	$0.373(100) = 37.3\%$
Good	$32/75 = 0.4266$	$0.426(100) = 42.7\%$
Fair	$10/75 = 0.133$	$0.133(100) = 13.3\%$
Poor	$5/75 = 0.067$	$0.066(100) = 6.7\%$

2. a. $(85-25)/5 = 12$ Rationale: Divide the range by the class size provided
 b. $(50-8)/3 = 14$ Rationale: Divide the range by the class size provided
 c. $(113-43)/7 = 10$ Rationale: Divide the range by the class size provided

- d. $(160-131)/2 = 14.5$ Rationale: Divide the range by the class size provided
3. a. 0.5 to 5.5 Rationale: See definition of class boundaries
 b. 70 to 81 Rationale: See definition of class boundaries
 c. 6.25 to 7.75 Rationale: See definition of class boundaries
4. a.

<u>Number of Tests</u>	<u>Frequency</u>	<u>Cumulative Frequency</u>
0-2	3	100
3-5	9	91
6-8	8	83
9-11	8	75
12-14	6	69
15-17	5	64
18-20	2	62
21-23	2	60
24-26	1	59
27-29	1	58
30-32	1	57
33-35	0	57
36-38	1	56
39-41	0	56
42-44	1	55

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- b. 12.02 Rationale: See definition of average
5. Rationale: Range is $88-12 = 76$. $76/10 = 7.6$ or 8 scores per interval (10 was selected as the desired number of intervals. Answers may vary)

Ages of Patients Treated with STDs
12-19
20-27
28-35
36-43
44-51
52-59
60-67
68-75
76-84
85-92

6. Rationale: Range is $442-58 = 384$. $384/25 = 15.36$ or 16 scores per interval.

Blood Glucose Levels
58-73
74-89
90-105
106-121
122-137
138-153
154-169
170-185
186-201
202-217
218-233
234-249
250-265
266-281
282-297

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298–313
314–329
330–345
346–361
362–377
378–393
394–409
410–425
426–441
442–457

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7. a.

Ages of Patient's Newly Diagnoses with Cancer	
2–8	
9–15	
16–22	
23–29	
30–36	
37–43	
44–50	
51–57	
58–64	
65–71	
72–78	
79–85	
86–92	

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b. 13 Rationale: See table above

8. a. Range is 133. Rationale: 291–158

b. 14 Rationale: $133/10 = 13.3$

c.

Serum Cholesterol	Frequency
150–159	1
160–169	1
170–179	2
180–189	2
190–199	2
200–209	3
210–219	4
220–229	8
230–239	10
240–249	6
250–259	4
260–269	3
270–279	2
280–289	2

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d.

Serum Cholesterol	Frequency	Cumulative Frequency
150–159	1	100
160–169	1	99
170–179	2	98

180–189	2	96
190–199	2	94
200–209	3	91
210–219	4	87
220–229	8	79
230–239	10	69
240–249	6	63
250–259	4	59
260–269	3	56
270–279	2	54
280–289	2	52

9. a. Range is 31. Rationale: 103–72

b.

Diastolic Blood Pressure	Score Boundaries	Frequency	Cumulative Frequency
71–73	70.5 to less than 73.5 (73.4)	1	100
74–76	73.5 to less than 76.5 (76.4)	3	97
77–79	76.5 to less than 79.5 (79.4)	7	90
80–82	79.5 to less than 82.5 (82.4)	13	77
83–85	82.5 to less than 85.5 (85.4)	11	66
86–88	85.5 to less than 88.5 (88.4)	17	49
89–91	88.5 to less than 91.5 (91.4)	9	40
92–94	91.5 to less than 94.5 (94.4)	6	34
95–97	94.5 to less than 97.5 (97.4)	9	25
98–100	97.5 to less than 100.5 (100.4)	5	20
101–103	100.5 to less than 103.5 (103.4)	3	17

- c. (1) 79.5 Rationale: Arrange scores from lowest to highest and divide scores into 4 equal parts
 (2) 95.5 Rationale: Arrange scores from lowest to highest and divide scores into 4 equal parts
 (3) 100 Rationale: Arrange all scores from lowest to highest and multiply by 0.9
 (4) 21st percentile Rationale: $17 + 0.5(1)/84 \times 100 = 21^{\text{st}}$ percentile
 (5) 48th percentile Rationale: $40 + 0.5(1)/84 \times 100 = 48^{\text{th}}$ percentile

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10. a. $N = 75$. Rationale: See definition of N .
b.

Days of Hospitalization	Frequency	Cumulative Frequency
1–2	16	100
3–4	13	87
5–6	15	72
7–8	8	64
9–10	6	58
11–12	3	55
13–14	5	50
15–16	2	48
17–18	5	43
19–20	2	41

- c. 1) 64% of scores are greater than 7–8 days
2) 48% of scores are greater than 15–16 days
d. 1) 71st percentile Rationale: $52 + 0.5(2)/75 \times 100 = 71^{\text{st}}$ percentile
2) 25th percentile Rationale: $16 + 0.5(6)/75 \times 100 = 25^{\text{th}}$ percentile
11. a. 1) Range for males is 62. Rationale: 91–29
2) Range for females is 46. Rationale: 94–48
3) Combined range is 65. Rationale: 94–29
b. 65.8 Rationale: See definition of average.

c.

Score Limits	Midpt.	<u>--Males--</u>		<u>--Females--</u>		<u>-Combined-</u>	
		<u>f</u>	<u>cf</u>	<u>f</u>	<u>cf</u>	<u>f</u>	<u>cf</u>
90-99	94.5	1	100	4	100	5	100
80-89	84.5	6	99	9	96	15	95
70-79	74.5	12	93	17	87	29	80
60-69	64.5	17	81	13	70	30	51
50-59	54.5	9	64	6	57	15	21
40-49	44.5	2	55	1	51	3	6
30-39	34.5	2	53	0	50	2	3
20-29	24.5	1	51	0	50	1	1

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- d. 1) 85 Rationale: $85 \times 100/100 = 85$ and the 85th ranked score is 85
 2) 15th percentile Rationale: $7 + 0.5(1)/50 \times 100 = 15^{\text{th}}$ percentile
 3) 70th percentile Rationale: $38 + 0.5(2)/50 \times 100 = 70^{\text{th}}$ percentile