Percentiles, Quartiles, and Deciles

California Residents Life Span
The following data is representing a sample of California Residents lifespan in years.

68, 45, 80, 34, 55, 67, 68, 88, 90, 25, 36, 45, 52, 68, 65, 70, 72, 45, 52, 89, 97, 64

Determine the following.

1. The percentile of the data value 52.
2. The percentile of the data value 70.
3. The percentile of the data value 45.
4. D_4?
5. Q_1?
6. D_9?
7. Q_2?
8. P_{55}?
9. P_{10}?
10. Q_3?
11. Range.
12. Inter quartile Range.
13. 10-90 Percentile Range

Sleep Time

The following data represents the amount of sleep time in hours for college students.

6, 0, 7, 4, 6, 7, 7, 6, 5, 8, 10, 4, 8, 5, 6,7,6, 7, 7, 5, 8, 6, 0, 7, 5, 4

Determine the following.

14. The percentile of the data value 8.
15. The percentile of the data value 6.
16. The percentile of the data value 4.
17. D_1?
18. Q_1?
19. D_9?
20. Q_2?
21. P_{62}?
22. P_{38}?
23. Q_3?
24. Range.
25. Inter quartile Range.
26. 10-90 Range

Annual Rainfall (inches) for St. Vegas

   The following table illustrates the annual rainfall in inches for the fictional town of St. Vegas. Answer the following questions.

Year	Inches
2000	14.7
2001	12.8
2002	13.6
2003	6.5
2004	12.2
2005	10.8
2006	16.5
2007	13.2
2008	7.8
2009	14.9
2010	22.3
2011	5.4
2012	10.9

Determine the following.

27. The percentile of the data value 12.8
28. The percentile of the data value 14.9
29. The percentile of the data value 7.8
30. D_1?
31. Q_1?
32. D_7?
33. Q_2?
34. P_{55}?
35. P_{90}?
36. Q_3?
37. Range.
38. Inter quartile Range.
39. 10-90 Range

California Resident's Life Span

Life Span Data		L	Sorted Life Span Data
68		1	25
45		2	34
80		3	36
34		4	45
55		5	45
67		6	45
68		7	52
88		8	52
90		9	55
25		10	64
36		11	65
45		12	67
52		13	68
68		14	68
65		15	68
70		16	70
72		17	72
45		18	80
52		19	88
89		20	89
97		21	90
64		22	97

1. Percentile of $52 = \frac{6}{22} \cdot 100 \approx \mathbf{27th}$ **percentile**

2. Percentile of $70 = \frac{15}{22} \cdot 100 \approx \mathbf{68th}$ **percentile**

3. Percentile of $45 = \frac{3}{22} \cdot 100 \approx \mathbf{14th}$ **percentile**

4. $L = \frac{40}{100} \cdot 22 = 8.8 \; rounded \; up \; to \; 9; \; \mathbf{D_4 = P_{40} = 55}$

5. $L = \frac{25}{100} \cdot 22 = 5.5 \; rounded \; up \; to \; 6; \; \mathbf{Q_1 = P_{25} = 45}$

6. $L = \frac{90}{100} \cdot 22 = 19.8 \; rounded \; up \; to \; 20; \; \mathbf{D_9 = P_{90} = 89}$

7. $L = \frac{50}{100} \cdot 22 = 11$ Whole Number; $\mathbf{Q_2 = P_{50} = \frac{65+67}{2} = 66}$

8. $L = \frac{55}{100} \cdot 22 = 12.1 \; rounded \; up \; to \; 13; \; \mathbf{P_{55} = 68}$

9. $L = \frac{10}{100} \cdot 22 = 2.2 \; rounded \; up \; to \; 3; \; \mathbf{P_{10} = 36}$

10. $L = \frac{75}{100} \cdot 22 = 16.5$ *rounded up to* 17; $\boldsymbol{Q_3 = P_{75} = 72}$

In earlier sections of this chapter we described several statis[...]
mean, median, mode, range, and standard deviation. Some other sta[...]
using quartiles and percentiles, as in the following:

$$\text{Interquartile range (or IQR)} = Q_3 - Q_1$$

$$\text{Semi-interquartile range} = \frac{Q_3 - Q_1}{2}$$

$$\text{Midquartile} = \frac{Q_3 + Q_1}{2}$$

$$\text{10–90 percentile range} = P_{90} - P_{10}$$

11. Range$= 97 - 25 = \boldsymbol{72}$

12. IQR$= Q_3 - Q_1 = 72 - 45 = \boldsymbol{27}$

13. 10-90 Percentile Range$= P_{90} - P_{10} = 89 - 36 = \boldsymbol{53}$

Sleep Time

Sleep Time Data		L	Sorted Sleep Time Data
6		1	0
0		2	0
7		3	4
4		4	4
6		5	4
7		6	5
7		7	5
6		8	5
5		9	5
8		10	6
10		11	6
4		12	6
8		13	6
5		14	6
6		15	6
7		16	7
6		17	7
7		18	7
7		19	7
5		20	7
8		21	7
6		22	7
0		23	8
7		24	8
5		25	8
4		26	10

14. Percentile of 8 $= \frac{22}{26} \cdot 100 \approx \mathbf{85th}$ **percentile**

15. Percentile of 6 $= \frac{9}{26} \cdot 100 \approx \mathbf{35th}$ **percentile**

16. Percentile of 4 $= \frac{2}{26} \cdot 100 \approx \mathbf{8th}$ **percentile**

17. $L = \frac{10}{100} \cdot 26 = 2.6 \; rounded \; up \; to \; 3; \; \mathbf{D_1 = P_{10} = 4}$

18. $L = \frac{25}{100} \cdot 26 = 6.5 \; rounded \; up \; to \; 7; \; \mathbf{Q_1 = P_{25} = 5}$

19. $L = \frac{90}{100} \cdot 26 = 23.4 \; rounded \; up \; to \; 24; \; \mathbf{D_9 = P_{90} = 8}$

20. $L = \frac{50}{100} \cdot 26 = 13$ Whole Number; $\mathbf{Q_2 = P_{50} = \frac{6+6}{2} = 6}$

21. $L = \frac{62}{100} \cdot 26 = 16.12$ *rounded up to* 17 ; $\textbf{\textit{P}}_{\textbf{62}} = \textbf{7}$

22. $L = \frac{38}{100} \cdot 26 = 9.88$ *rounded up to* 10 ; $\textbf{\textit{P}}_{\textbf{38}} = \textbf{6}$

23. $L = \frac{75}{100} \cdot 26 = 19.5$ *rounded up to* 20; $\textbf{\textit{Q}}_{\textbf{3}} = \textbf{\textit{P}}_{\textbf{75}} = \textbf{7}$

In earlier sections of this chapter we described several statist
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using quartiles and percentiles, as in the following:

Interquartile range (or IQR) $= Q_3 - Q_1$

Semi-interquartile range $= \dfrac{Q_3 - Q_1}{2}$

Midquartile $= \dfrac{Q_3 + Q_1}{2}$

10–90 percentile range $= P_{90} - P_{10}$

24. Range$= 10 - 0 = \textbf{10}$

25. IQR$= Q_3 - Q_1 = 7 - 5 = \textbf{2}$

26. 10-90 Percentile Range$= P_{90} - P_{10} = 8 - 4 = \textbf{4}$

Annual Rainfall (inches) for St. Vegas

Annual Rain Fall Data
14.7
12.8
13.6
6.5
12.2
10.8
16.5
13.2
7.8
14.9
22.3
5.4
10.9

L	Sorted Annual Rainfall Data
1	5.4
2	6.5
3	7.8
4	10.8
5	10.9
6	12.2
7	12.8
8	13.2
9	13.6
10	14.7
11	14.9
12	16.5
13	22.3

27. Percentile of $12.8 = \frac{6}{13} \cdot 100 \approx \textbf{47th}$ **percentile**

28. Percentile of $14.9 = \frac{10}{13} \cdot 100 \approx \textbf{77th}$ **percentile**

29. Percentile of $7.8 = \frac{2}{13} \cdot 100 \approx \textbf{15th}$ **percentile**

30. $L = \frac{10}{100} \cdot 13 = 1.3$ *rounded up to* 2; $\boldsymbol{D_1 = P_{10} = 6.5}$

31. $L = \frac{25}{100} \cdot 13 = 3.25$ *rounded up to* 4; $\boldsymbol{Q_1 = P_{25} = 10.8}$

32. $L = \frac{70}{100} \cdot 13 = 9.1$ *rounded up to* 10; $\boldsymbol{D_7 = P_{70} = 14.7}$

33. $L = \frac{50}{100} \cdot 13 = 6.5$ *rounded up to* 7; $\boldsymbol{Q_2 = P_{50} = 12.8}$

34. $L = \frac{55}{100} \cdot 13 = 7.15$ *rounded up to* 8; $\boldsymbol{P_{55} = 13.2}$

35. $L = \frac{90}{100} \cdot 13 = 11.7$ *rounded up to* 12; $\boldsymbol{P_{90} = 16.5}$

36. $L = \frac{75}{100} \cdot 13 = 9.75$ *rounded up to* 10; $\boldsymbol{Q_3 = P_{75} = 14.7}$

In earlier sections of this chapter we described several statist
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Interquartile range (or IQR) $= Q_3 - Q_1$

Semi-interquartile range $= \dfrac{Q_3 - Q_1}{2}$

Midquartile $= \dfrac{Q_3 + Q_1}{2}$

10–90 percentile range $= P_{90} - P_{10}$

37. Range$= 22.3 - 5.4 = \mathbf{16.9}$

38. Inter quartile Range$= 14.7 - 10.8 = \mathbf{3.9}$

39. 10-90 Range$= P_{90} - P_{10} = 16.5 - 6.5 = \mathbf{10}$