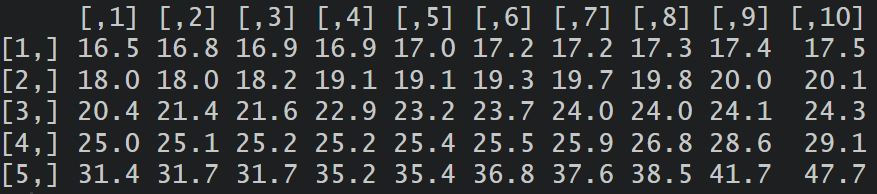
***Sec. 3-1 (p.130)***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **8.** | **Top-Paid CEOs**  The data shown are the total compensation (報酬) (in millions of dollars) for the 50 top-paid CEOs for a recent year. Compare the averages, and state which one you think is the best measure.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 17.5 | 18 | 36.8 | 31.7 | 31.7 | | 17.3 | 24.3 | 47.7 | 38.5 | 17 | | 23.7 | 16.5 | 25.1 | 17.4 | 18 | | 37.6 | 19.7 | 21.4 | 28.6 | 21.6 | | 19.3 | 20 | 16.9 | 25.2 | 19.8 | | 25 | 17.2 | 20.4 | 20.1 | 29.1 | | 19.1 | 25.2 | 23.2 | 25.9 | 24 | | 41.7 | 24 | 16.8 | 26.8 | 31.4 | | 16.9 | 17.2 | 24.1 | 35.2 | 19.1 | | 22.9 | 18.2 | 25.4 | 35.4 | 25.5 | |

* 排序後的資料



It appears that mean and median are good measures of average.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **10.** | **Foreign Workers**  The number of foreign workers' certificates for the New England states and the northwestern states is shown. Find the mean, median, and mode for both areas and compare the results.   |  |  | | --- | --- | | **New England states** | **Northwestern states** | | 6768 | 1870 | | 3196 | 622 | | 1112 | 620 | | 819 | 23 | | 1019 | 172 | | 1795 | 112 | |

* 排序 (小 大) 偶數

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **New England states** | 819 | 1019 | 1112 | 1795 | 3196 | 6768 |
| **Northwestern states** | 23 | 112 | 172 | 620 | 622 | 1870 |

|  |  |  |
| --- | --- | --- |
|  | **New England states** | **Northwestern states** |
| **Mean** | = (819 + 1019 + … + 6768) / 6 = 2451.5 | = (23 + 112 + … + 1870) / 6 = 569.8 |
| **Median** | = (1112 + 1795) / 2 = 1453.5 | = (172 + 620) / 2 = 396 |
| **Mode** | 沒有眾數 (每個值都只有一次) | 沒有眾數 (每個值都只有一次) |

The measure of central tendency are much larger for New England states.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **16.** | **Percentage of Foreign-Born People**  The percentage of foreign-born population for each of the 50 states is represented here. Find the mean and modal class for the data. Do you think the mean is the best average for this set of data? Explain.   |  |  | | --- | --- | | **Percentage** | **Frequency** | | 0.8 - 4.4 | 26 | | 4.5 - 8.1 | 11 | | 8.2 - 11.8 | 4 | | 11.9 - 15.5 | 5 | | 15.6 - 19.2 | 2 | | 19.3 - 22.9 | 1 | | 23.0 - 26.6 | 1 | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Percentage** | **Frequency** | **Midpoint** |  |
| 0.8 - 4.4 | 26 | 2.6 | 67.6 |
| 4.5 - 8.1 | 11 | 6.3 | 69.3 |
| 8.2 - 11.8 | 4 | 10 | 40 |
| 11.9 - 15.5 | 5 | 13.7 | 68.5 |
| 15.6 - 19.2 | 2 | 17.4 | 34.8 |
| 19.3 - 22.9 | 1 | 21.1 | 21.1 |
| 23.0 - 26.6 | 1 | 24.8 | 24.8 |
|  | n = 50 |  | Total = 326.1 |

The mean is probably not the best measure of central rendency for this data because the data is “bottom heavy”.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **20.** | **Commissions Earned**  This frequency distribution represents the commission (傭金) earned (in dollars) by 100 salespeople employed at several branches of a large chain store. Find the mean and modal class for the data.   |  |  | | --- | --- | | **Class limits** | **Frequency** | | 150 -158 | 5 | | 159 - 167 | 16 | | 168 - 176 | 20 | | 177 - 185 | 21 | | 186 - 194 | 20 | | 195 - 203 | 15 | | 204 - 212 | 3 | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Class limits** | **Frequency** | **Midpoint** |  |
| 150 -158 | 5 | 154 | 770 |
| 159 - 167 | 16 | 163 | 2608 |
| 168 - 176 | 20 | 172 | 3440 |
| 177 - 185 | 21 | 181 | 3801 |
| 186 - 194 | 20 | 190 | 3800 |
| 195 - 203 | 15 | 199 | 2985 |
| 204 - 212 | 3 | 208 | 624 |
|  | n = 100 |  | Total = 18028 |

|  |  |
| --- | --- |
| **28.** | **Final Grade**  Another instructor gives four 1-hour exams and one final exam, which counts as two 1-hour exams. Find a student's grade if she received 62, 83, 97, and 90 on the 1-hour exams and 82 on the final exam. |

|  |  |
| --- | --- |
| **30.** | Describe which measure of central tendency ⎯ mean, median, or mode ⎯ was probably used in each situation.   1. One-half of the factory workers make more than $5.37 per hour, and one-half make less than $5.37 per hour.   (一半的工廠工人每小時賺超過5.37美元，而另一半每小時賺不到5.37美元)   1. The average number of children per family in the Plaza Heights Complex is 1.8.   (Plaza Heights 複合區每户家庭的平均子女數是1.8)   1. Most people prefer red convertibles over any other color.   (大多數人更喜歡紅色敞篷車而不是其他任何顏色)   1. The average person cuts the lawn once a week.   (一般人每周修剪草坪一次)   1. The most common fear today is fear of speaking in public.   (如今最普遍的恐懼是對公開演講的恐懼)   1. The average age of college professors is 42.3 years.   (大學教授的平均年齡是42.3歲) |

1. Median
2. Mean
3. Mode
4. Mode (一般人屬於大眾)
5. Mode
6. Mean

***Sec. 3-2 (p.151)***

|  |  |
| --- | --- |
| **8.** | **Cigarette Taxes**  The increases (in cents) in cigarette taxes for 17 states in a 6-month period are  60, 20, 40, 40, 45, 12, 34, 51, 30, 70, 42, 31, 69, 32, 8, 18, 50  Find the range, variance, and standard deviation for the data. Use the range rule of thumb to estimate the standard deviation. Compare the estimate to the actual standard deviation. |

|  |  |  |  |
| --- | --- | --- | --- |
|  | |  | 1. **Range:** 2. **Variance:** 3. **Standard deviation:** 4. **Range rule of thumb of :** 5. **Conclusion:**   This is close to the actual standard deviation of 18.2. |
| 60 | | 3600 |
| 20 | | 400 |
| 40 | | 1600 |
| 40 | | 1600 |
| 45 | | 2025 |
| 12 | | 144 |
| 34 | | 1156 |
| 51 | | 2601 |
| 30 | | 900 |
| 70 | | 4900 |
| 42 | | 1764 |
| 31 | | 961 |
| 69 | | 4761 |
| 32 | | 1024 |
| 8 | | 64 |
| 18 | | 324 |
| 50 | | 2500 |
|  | |  |
| [**18.**](sec3.xlsx) | Use the data from Exercises 7, 15, and 17 (spending, laws, precipitation days) and compare the standard deviation with that obtained by the range rule of thumb(R/4). Comment on the results.   1. **Traveler Spending**  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 20.1 | 33.5 | 21.7 | 58.4 | 23.2 | 110.8 | 30.9 | 24.0 | 74.8 | 60.0 |   **15. Laws Passed**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 283 | 394 | 383 | 580 | 498 | 460 | 377 | 482 |   **17. Annual Precipitation Days (年降雨天数)**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 135 | 128 | 136 | 78 | 116 | 77 | 111 | 79 | 44 | 97 | | 116 | 123 | 88 | 102 | 26 | 82 | 156 | 133 | 107 | 35 | | 112 | 98 | 45 | 122 | 125 |  |  |  |  |  | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| Data | **Traveler Spending** | **Laws Passed** | **Annual Precipitation Days** |
| Standard deviation |  |  |  |
| Range rule of thumb |  |  |  |
| difference | 7.2 | 17.2 | 1.5 |

The closest estimate is for precipitation. The estimate for spending is also close.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **20.** | **Automotive Fuel Efficiency**  Thirty automobiles (汽車) were tested for fuel efficiency (燃油效率測試) (in miles per gallon). This frequency distribution was obtained. Find the variance and standard deviation for the data.   |  |  | | --- | --- | | **Class boundaries** | **Frequency** | | 7.5-12.5 | 3 | | 12.5-17.5 | 5 | | 17.5-22.5 | 15 | | 22.5-27.5 | 5 | | 27.5-32.5 | 2 | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class boundaries** | **Frequency** |  |  |  | 1. **Sample variance** 2. **Sample standard deviation** |
| 7.5-12.5 | 3 | 10 | 30 | 300 |
| 12.5-17.5 | 5 | 15 | 75 | 1125 |
| 17.5-22.5 | 15 | 20 | 300 | 6000 |
| 22.5-27.5 | 5 | 25 | 125 | 3125 |
| 27.5-32.5 | 2 | 30 | 60 | 1800 |
| Total | 30 |  | 590 | 12350 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **28.** | **Suspension Bridges**  The lengths (in feet) of the main span (跨距) of the longest suspension bridges (吊橋) in the United States and the rest of the world are shown below. Which set of data is more variable?   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | United States | 4205 | 4200 | 3800 | 3500 | 3478 | 2800 | 2800 | 2310 | | World | 6570 | 5538 | 5328 | 4888 | 4626 | 4544 | 4518 | 3970 | |

比較 使用變異係數:

**US:**

**World:**

**Conclusion:** The data of US is more variable.

|  |  |
| --- | --- |
| **30.** | **Ages of Accountants**  The average age of the accountants (會計師) at Three Rivers Corp. (corporation, 公司) is 26 years, with a standard deviation of 6 years; the average salary of the accountants is $31,000, with a standard deviation of $4000. Compare the variations of age and income. |

|  |  |  |
| --- | --- | --- |
|  | Age | Income |
|  |  |  |

Age is more variable.

|  |  |
| --- | --- |
| **33.** | In a distribution of 160 values with a mean of 72, at least 120 fall within the interval 67-77. Approximately what percentage of values should fall in the interval 62-82? Use Chebyshev's theorem. |

Chebyshev's Thm.: 落在k倍標準差內的比例至少有

1. 的資料落在 67 – 77 區間內

At least 93.75 percentage of values should fall in the interval 62-82.

|  |  |
| --- | --- |
| **34.** | **Calories in Bagels**  The average number of calories in a regular-size bagel is 240. If the standard deviation is 38 calories, find the range in which at least 75% of the data will lie. Use Chebyshev's theorem. |

Range:

At least 75% of the data will fall in the interval 164-316.

|  |  |
| --- | --- |
| **38.** | **Trials to Learn a Maze**  The average of the number of trials it took a sample of mice to learn to traverse (通過) a maze (迷宮) was 12. The standard deviation was 3. Using Chebyshev's theorem, find the minimum percentage of data values that will fall in the range of 4-20 trials. |

At least 85.9% of the data will fall in the interval 4-20.

|  |  |
| --- | --- |
| **42.** | **Work Hours for College Faculty**  The average fulltime faculty member (全職教員) in a postsecondary degree-granting institution (授予高等教育學位的機構) works an average of 53 hours per week.   1. If we assume the standard deviation is 2.8 hours, what percentage of faculty members work more than 58.6 hours a week? 2. If we assume a bell-shaped distribution, what percentage of faculty members work more than   58.6 hours a week? |

By Chebyshev's Thm. 有75%的工作時間落在2倍標準差內.因為不知道資料分布是否為對稱的，我們可以說每周工作超過58.6小時的全職教員不超過25%。

1. 假設資料為對稱分布，根據經驗法則(Empirical rule)，有95%的資料落在2倍標準差內

則有 的員工工作超過58.6小時。

|  |  |
| --- | --- |
| **46.** | **Bonuses (獎金)**  The mean and standard deviation of the bonuses that the employees of a company received 10 years ago were, respectively, $2,000 and $325. Today the amount of the bonuses is 5 times what it was 10 years ago. Find the mean and standard deviation of the new bonuses. |

***Sec. 3-3 (p.167)***

|  |  |
| --- | --- |
| **10.** | **Age of Senators**  The average age of Senators (參議員) in the 114th congress (國會) was 61.7 years. If the standard deviation was 10.6, find the z scores of a senator who is 48 years old and one who is 66 years old. |

|  |  |  |
| --- | --- | --- |
| 48 years old |  |  |
| 66 years old |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **12.** | **Teacher's Salary**  The average teacher's salary in a particular state is $54,166. If the standard deviation is $10,200, find the salaries corresponding to the following z scores.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 1. 2 | 1. -1 | 1. 0 | 1. 2.5 | 1. -1.6 | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a. | b. | c. | d. | e. |
|  |  |  |  |  |

|  |  |
| --- | --- |
| **15.** | **Annual Miles Driven**  The average miles driven (行駛里程) annually per licensed driver in the United States is approximately 14,090 miles. If we assume a fairly mound-shaped distribution with a standard deviation of approximately 3500 miles, find the following:   1. z score for 16,000 miles 2. z score for 10,000 miles 3. Number of miles corresponding to z scores of 1.6, -0.5, and 0. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | |  | | |
| a. | b. | c. | | |
|  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **17.** | The data show the population (in thousands) for a recent year of a sample of cities in South Carolina (南卡羅萊納州).   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 29 | 26 | 15 | 13 | 17 | 58 | 14 | 25 | 37 | | 19 | 40 | 67 | 23 | 10 | 97 | 12 | 129 | 27 | | 20 | 18 | 120 | 35 | 66 | 21 | 11 | 43 | 22 |   Find the data value that corresponds to each percentile.   |  |  |  |  | | --- | --- | --- | --- | | 1. 40th percentile | 1. 75th percentile | 1. 90th percentile | 1. 30th percentile |   Using the same data, find the percentile corresponding to the given data value.   |  |  |  |  | | --- | --- | --- | --- | | 1. 27 | 1. 40 | 1. 58 | 1. 67 | |

|  |  |  |  |
| --- | --- | --- | --- |
| Given percentile: , | | | |
| a. | b. | c. | d. |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Given data value: | | | |
| e. | f. | g. | h. |
|  |  |  |  |
| 27高於57%的資料 | 40高於72%的資料 | 58高於80%的資料 | 67高於87%的資料 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **20.** | **Airplane Speeds**  The airborne (飛行中的) speeds in miles per hour of 21 planes are shown.   |  |  | | --- | --- | | **Class** | **Frequency** | | 366-386 | 4 | | 387-407 | 2 | | 408-428 | 3 | | 429-449 | 2 | | 450-470 | 1 | | 471-491 | 2 | | 492-512 | 3 | | 513-533 | 4 | | **Total** | 21 |   Find the approximate values that correspond to the given percentiles by constructing a percentile graph.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 1. 9th | 1. 20th | 1. 45th | 1. 60th | 1. 75th |   Using the same data, find the approximate percentile ranks of the following speeds in miles per hour (mph).   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 1. 380 mph | 1. 425 mph | 1. 455 mph | 1. 505 mph | 1. 525 mph | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Class** | **Boundaries** | | **Frequency** | **Cumulative freq.** | **Cumulative percent** |
| 366-386 | 365.5 | 386.5 | 4 | 4 | 19 |
| 387-407 | 386.5 | 407.5 | 2 | 6 | 29 |
| 408-428 | 407.5 | 428.5 | 3 | 9 | 43 |
| 429-449 | 428.5 | 449.5 | 2 | 11 | 52 |
| 450-470 | 449.5 | 470.5 | 1 | 12 | 57 |
| 471-491 | 470.5 | 491.5 | 2 | 14 | 67 |
| 492-512 | 491.5 | 512.5 | 3 | 17 | 81 |
| 513-533 | 512.5 | 533.5 | 4 | 21 | 100 |
| **Total** |  | | 21 |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1. 9th | 1. 20th | 1. 45th | 1. 60th | 1. 75th |
| Approximate value | 376 | 387 | 429 | 477 | 502 |
| 解答的答案 | 375 | 389 | 433 | 477 | 504 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1. 380 mph | 1. 425 mph | 1. 455 mph | 1. 505 mph | 1. 525 mph |
| Approximate percentile | 15 | 40 | 55 | 75 | 95 |
| 解答的答案 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **25.** | **Taxes**  The data for a recent year show the taxes (in millions of dollars) received from a random sample of 10 states. Find the first and third quartiles and the IQR.   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 13 | 15 | 32 | 36 | 11 | 24 | 6 | 25 | 11 | 71 | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 排序 | 6 | 11 | 11 | 13 | 15 | 24 | 25 | 32 | 36 | 71 |

|  |  |
| --- | --- |
| Method 1 | Method 2 |
|  |  |
|  | |

|  |  |
| --- | --- |
| **28.** | **Police Calls in Schools**  The number of incidents (事件) in which police were needed for a sample of 9 schools in Allegheny County (阿利根尼縣, 美國賓夕法尼亞州西部) is 7, 37, 3, 8, 48, 11, 6, 0, 10. Find the first and third quartiles for the data. |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 排序 | 0 | 3 | 6 | 7 | 8 | 10 | 11 | 37 | 48 |

|  |  |
| --- | --- |
| Method 1 | Method 2 |
|  | 取3，小樣本誤差會大  內插法: |
|  |  |

法1比較簡單ヽ(✿ﾟ▽ﾟ)ノ

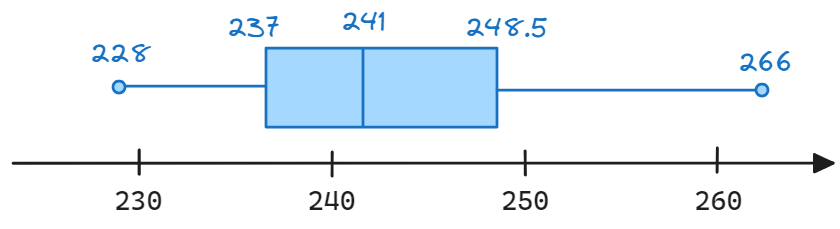
***[Sec. 3-4 (p.180)](#S1_4)***

|  |  |
| --- | --- |
| **8.** | Use each boxplot to identify the maximum value, minimum value, median, first quartile, third quartile and interquartile range. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Max | Min | Median = Q2 | Q1 | Q3 | IQR = Q3 – Q1 |
| 325 | 200 | 275 | 225 | 300 | 300 – 225 = 75 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **12.** | **Innings Pitched**  Construct a boxplot for the following data which represent the number of innings pitched (IP, 投球局數) by the ERA (earned run average, 投手防禦率) leaders for the past few years. Comment on the shape of the distribution.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 239 | 266 | 245 | 236 | 241 | 246 | 240 | | 249 | 251 | 238 | 228 | 248 | 232 |  | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 排序 | 228 | 232 | 236 | 238 | 239 | 240 | 241 | 245 | 246 | 248 | 249 | 251 | 266 |



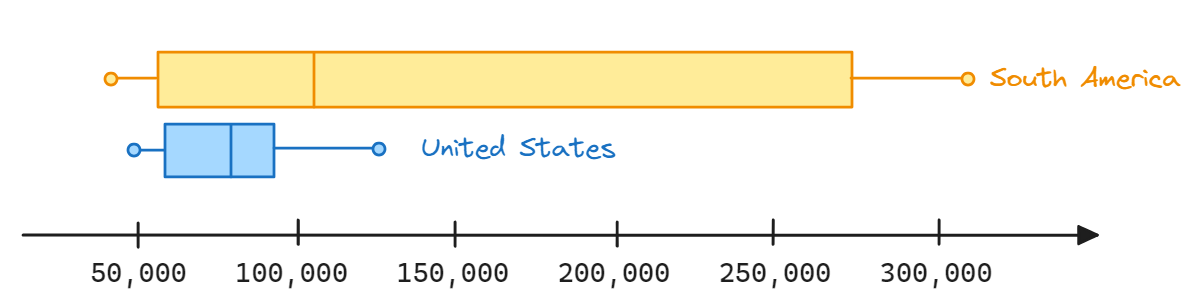
The distribution is slightly right-skewed. (右邊的線段較長且中位數偏箱子左邊)

()

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **16.** | **Size of Dams**  These data represent the volumes (體積) in cubic yards (立方碼) of the largest dams (水壩) in the United States and in South America. Construct a boxplot of the data for each region and compare the distributions.   |  |  | | --- | --- | | **United States** | **South America** | | 125,628 | 311,539 | | 92,000 | 274,026 | | 78,008 | 105,944 | | 77,700 | 102,014 | | 66,500 | 56,242 | | 62,850 | 46,563 | | 52,435 |  | | 50,000 |  | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 排序 | United States | 50,000 | 52,435 | 62,850 | 66,500 | 77,700 | 78,008 | 92,000 | 125,628 |
| South America | 46,563 | 56,242 | 102,014 | 105,944 | 274,026 | 311,539 |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | min | max | Q1 | Q2 | Q3 | mean |
| **United States** | 50,000 | 125,628 | 57,642.5 | 72,100 | 85,004 | 75,640 |
| **South America** | 46,563 | 311,539 | 56,242 | 103,979 | 274,026 | 149,388 |



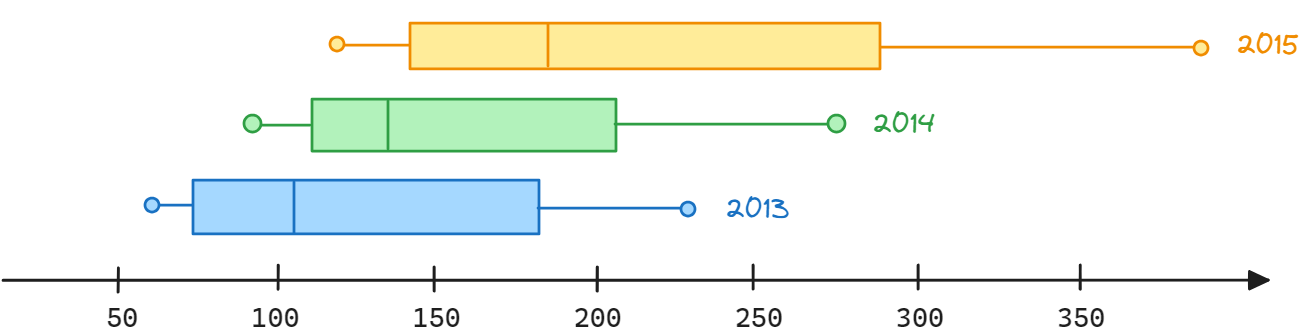
The range and variation of the capacity of the dams in South America is considerably larger than those of the United States. Both United States and South America are right-skewed.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **18.** | **Number of Tornadoes** (龍捲風)  (hurricane, 颶風，和龍捲風相比影響範圍較大) (typhoon, 颱風，和颶風一樣同屬熱帶氣旋)  A four-month record for the number of tornadoes in 2013-2015 is given here.   |  |  |  |  | | --- | --- | --- | --- | |  | **2013** | **2014** | **2015** | | **April** | 80 | 130 | 170 | | **May** | 227 | 133 | 382 | | **June** | 126 | 280 | 184 | | **July** | 69 | 90 | 116 |  1. Which month had the highest mean number of tornadoes for this 3-year period? 2. Which year has the highest mean number of tornadoes for this 4-month period? 3. Construct three boxplots and compare the distributions. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2013** | **2014** | **2015** | **mean** |
| **April** | 80 | 130 | 170 | 126.67 |
| **May** | 227 | 133 | 382 | 247.33 |
| **June** | 126 | 280 | 184 | 196. 67 |
| **July** | 69 | 90 | 116 | 91. 67 |
| **mean** | 125.5 | 158.25 | 213 |  |

1. The month with the highest mean number of tornadoes is May.
2. The year with the highest mean number of tornadoes is 2015.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | min | Q1 | Q2 | Q3 | max | mean |
| **2013** | 69 | (69+80)/2=74.5 | (126+80)/2=103 | (126+227)/2=176.5 | 227 | 125.5 |
| **2014** | 90 | (90+130)/2=110 | (130+133)/2=131.5 | (133+280)/2=206.5 | 280 | 158.25 |
| **2015** | 116 | (116+170)/2=143 | (170+184)/2=177 | (184+382)/2=283 | 382 | 213 |



The distribution for 2013, 2014, and 2015 are positively skewed. The data for 2013 appears to be the least variable