

# Basic Data Analysis

Midterm Test

May 28, 2009

## Problems

When you are asked to do a calculation, you do not need to compute the decimal equivalent of a fraction or radical (square root). Fractions should be reduced to lowest terms for convenience in grading. Radicals do not need to be reduced.

For Problems 1 to 5, use **Data Set A**. (Each student receives a different data set.) Data Set A is a data set of temperatures. Classify the temperatures according to the following *subjective temperature* scale: less than 20 is (uncomfortably) “cold,” 20-22 is “cool,” 23-25 is “warm,” and above 25 is (uncomfortably) “hot.” **Copy your data set here:**

1. *Sort* your raw data, and write the sorted data here.
2. Convert your data to “subjective temperatures,” and enter the absolute, relative, and cumulative relative frequency distributions here. What is the *median* of your data?

3. For each “subjective temperature,” choose a *representative numerical temperature*. Enter the correspondence here. **Explain why you chose each numerical value.**
  
4. Using the representative temperatures you chose in the previous problem, compute the *mean*, *variance*, and *standard deviation* of the *distribution* of temperatures.
  
5. Pick **one** of the following three problems, and answer in the space provided.
  - (a) The data set of temperatures was derived from the daily temperatures at noon *over a 10-day period* at one place somewhere in Japan.
  - (b) The data set of temperatures was derived from the daily temperatures at noon *on May 28 over a 10-year period* at one place somewhere in Japan.
  - (c) The data set of temperatures was derived from the temperature at noon on the same day at ten cities in Japan.

For your chosen problem, give an example of some “hidden factor” affecting the data set that could affect the way you use your statistical analysis using distributions. Explain why this matters.

For Problems 6 to 10, use **Data Set B**. (Each student receives a different data set.) Data Set B is a data set of examination scores on a 0-100 scale.

**Copy your data set here:**

1. Give the definition of *mode*. Enter the mode of the *raw* data from Data Set B. Convert Data Set B to letter grades according to the usual scale, and enter a table containing the letter grade, the *scale*, the absolute frequency, the relative frequency, and the cumulative frequency distribution. What is the *mode* of the distribution of letter grades?
2. In theory, the mode of the raw scores could be “different” from the mode of the distribution of letter grades. Explain how to compare the raw score to a letter grade, when one is a number and the other is a letter. Explain how the modes could be different (*i.e.*, what kind of data set (an example is OK) would generate different modes. Are the mode of the raw data and the mode of the distribution “different” in your data set?
3. Is your data set *positively skewed*, *negatively skewed*, or *not skewed*? Explain.

4. Draw a histogram for the *raw* data set. Drawing a histogram involves a choice of division into cells of values. (Recall that a *cell* is a group of values that are close to each other.) Explain why you choose the cells you did.

5. Choose one of the following two groups of students:

- (a) the students who did “very well” on the exam, or
- (b) the students who did “very badly” on the exam.

*Enter the group you chose, and discuss whether you think the examination scores are likely to accurately reflect the *actual ability and knowledge* of the students in that group. Refer to the distribution of actual test scores in your explanation.*

- 1 Your distributions have examination ID #1. Be sure to enter your examination ID in the space provided.

Distribution A: 21 21 22 16 22 18 24 19 22 25

Distribution B: 100 63 100 92 90 100 82 54 81 100

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- 2 Your distributions have examination ID #2. Be sure to enter your examination ID in the space provided.

Distribution A: 23 25 24 25 15 21 23 19 18 20

Distribution B: 92 100 54 90 82 100 100 100 81 63

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- 3 Your distributions have examination ID #3. Be sure to enter your examination ID in the space provided.

Distribution A: 24 23 25 28 21 30 25 21 20 21

Distribution B: 100 63 81 100 100 100 90 82 54 92

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- 4 Your distributions have examination ID #4. Be sure to enter your examination ID in the space provided.

Distribution A: 22 26 16 23 11 15 19 14 19 31

Distribution B: 92 63 100 100 81 54 90 82 100 100

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- 5 Your distributions have examination ID #5. Be sure to enter your examination ID in the space provided.

Distribution A: 24 24 25 23 25 22 27 22 26 28

Distribution B: 100 100 81 54 90 100 92 100 82 63

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6 Your distributions have examination ID #6. Be sure to enter your examination ID in the space provided.

Distribution A: 28 29 25 22 22 21 24 18 25 21

Distribution B: 100 100 100 82 63 81 54 100 92 90

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7 Your distributions have examination ID #7. Be sure to enter your examination ID in the space provided.

Distribution A: 30 25 17 27 25 25 21 22 26 24

Distribution B: 100 92 100 100 54 63 90 82 81 100

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8 Your distributions have examination ID #8. Be sure to enter your examination ID in the space provided.

Distribution A: 29 28 29 28 31 28 25 27 29 25

Distribution B: 63 81 90 100 100 100 100 54 82 92

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9 Your distributions have examination ID #9. Be sure to enter your examination ID in the space provided.

Distribution A: 29 28 31 27 26 28 28 24 27 24

Distribution B: 100 100 54 63 100 82 81 100 92 90

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10 Your distributions have examination ID #10. Be sure to enter your examination ID in the space provided.

Distribution A: 28 22 28 30 30 26 31 25 26 31

Distribution B: 90 100 63 82 54 100 81 100 92 100

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- 11 Your distributions have examination ID #11. Be sure to enter your examination ID in the space provided.

Distribution A: 24 27 33 30 30 21 24 31 31 34

Distribution B: 90 100 100 82 54 100 63 92 81 100

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- 12 Your distributions have examination ID #12. Be sure to enter your examination ID in the space provided.

Distribution A: 36 28 17 32 26 35 35 33 26 27

Distribution B: 82 92 100 81 63 100 100 54 100 90

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- 13 Your distributions have examination ID #13. Be sure to enter your examination ID in the space provided.

Distribution A: 21 26 19 24 19 21 23 21 19 23

Distribution B: 92 100 63 90 82 100 54 100 81 100

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- 14 Your distributions have examination ID #14. Be sure to enter your examination ID in the space provided.

Distribution A: 29 22 25 22 20 21 22 18 20 21

Distribution B: 100 100 81 100 54 100 92 82 63 90

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- 15 Your distributions have examination ID #15. Be sure to enter your examination ID in the space provided.

Distribution A: 25 18 26 19 32 27 20 25 24 26

Distribution B: 90 100 100 82 54 81 92 63 100 100

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- 16 Your distributions have examination ID #16. Be sure to enter your examination ID in the space provided.

Distribution A: 18 22 18 22 24 22 28 24 28 27

Distribution B: 90 100 81 63 92 54 100 100 82 100

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- 17 Your distributions have examination ID #17. Be sure to enter your examination ID in the space provided.

Distribution A: 25 23 23 26 25 24 28 22 21 28

Distribution B: 63 90 54 100 82 92 100 100 81 100

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- 18 Your distributions have examination ID #18. Be sure to enter your examination ID in the space provided.

Distribution A: 22 20 29 27 26 22 25 25 29 26

Distribution B: 100 100 63 100 82 90 81 92 54 100

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- 19 Your distributions have examination ID #19. Be sure to enter your examination ID in the space provided.

Distribution A: 22 27 35 28 26 20 25 19 28 28

Distribution B: 92 63 82 54 81 100 100 90 100 100

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- 20 Your distributions have examination ID #20. Be sure to enter your examination ID in the space provided.

Distribution A: 30 19 26 14 35 30 23 16 28 26

Distribution B: 81 100 82 63 100 100 54 92 90 100

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21 Your distributions have examination ID #21. Be sure to enter your examination ID in the space provided.

Distribution A: 28 27 24 27 31 27 26 28 24 27

Distribution B: 90 100 100 82 81 100 63 54 100 92

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22 Your distributions have examination ID #22. Be sure to enter your examination ID in the space provided.

Distribution A: 27 32 27 27 28 26 30 29 28 29

Distribution B: 54 92 82 100 100 81 63 100 100 90

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23 Your distributions have examination ID #23. Be sure to enter your examination ID in the space provided.

Distribution A: 15 27 26 33 20 34 25 25 27 28

Distribution B: 100 54 82 100 81 92 63 100 100 90

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24 Your distributions have examination ID #24. Be sure to enter your examination ID in the space provided.

Distribution A: 32 20 24 27 30 19 31 26 26 33

Distribution B: 100 92 100 63 54 100 90 82 81 100

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25 Your distributions have examination ID #25. Be sure to enter your examination ID in the space provided.

Distribution A: 22 24 18 24 22 22 23 26 24 23

Distribution B: 90 54 92 82 63 100 81 100 100 100

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26 Your distributions have examination ID #26. Be sure to enter your examination ID in the space provided.

Distribution A: 24 27 21 23 19 23 18 24 28 18

Distribution B: 100 92 82 100 63 100 100 90 81 54

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27 Your distributions have examination ID #27. Be sure to enter your examination ID in the space provided.

Distribution A: 17 25 23 22 17 17 20 21 24 21

Distribution B: 81 82 100 100 100 90 100 92 63 54

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28 Your distributions have examination ID #28. Be sure to enter your examination ID in the space provided.

Distribution A: 22 26 29 25 17 29 29 21 25 19

Distribution B: 92 82 63 100 81 100 100 90 54 100

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29 Your distributions have examination ID #29. Be sure to enter your examination ID in the space provided.

Distribution A: 27 22 25 25 24 27 24 24 24 24

Distribution B: 63 100 100 90 82 100 92 81 54 100

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30 Your distributions have examination ID #30. Be sure to enter your examination ID in the space provided.

Distribution A: 24 30 30 24 21 26 25 22 26 25

Distribution B: 82 100 90 81 100 63 54 92 100 100

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31 Your distributions have examination ID #31. Be sure to enter your examination ID in the space provided.

Distribution A: 17 25 23 22 22 25 16 24 29 27

Distribution B: 81 100 100 82 90 54 100 92 63 100

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32 Your distributions have examination ID #32. Be sure to enter your examination ID in the space provided.

Distribution A: 21 27 21 17 31 28 27 28 38 17

Distribution B: 81 100 92 100 82 100 90 63 100 54

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33 Your distributions have examination ID #33. Be sure to enter your examination ID in the space provided.

Distribution A: 29 31 26 27 30 28 30 30 27 28

Distribution B: 92 100 82 100 81 90 63 100 100 54

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34 Your distributions have examination ID #34. Be sure to enter your examination ID in the space provided.

Distribution A: 26 27 25 25 30 31 29 29 27 27

Distribution B: 90 100 81 92 100 54 82 100 63 100

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35 Your distributions have examination ID #35. Be sure to enter your examination ID in the space provided.

Distribution A: 23 23 23 29 28 36 30 20 34 33

Distribution B: 63 100 54 100 92 100 100 82 90 81

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36 Your distributions have examination ID #36. Be sure to enter your examination ID in the space provided.

Distribution A: 21 31 30 24 38 26 23 15 33 31

Distribution B: 100 81 100 100 92 54 90 100 63 82

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37 Your distributions have examination ID #37. Be sure to enter your examination ID in the space provided.

Distribution A: 24 24 21 24 23 21 23 23 23 23

Distribution B: 100 100 54 90 100 100 92 82 63 81

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38 Your distributions have examination ID #38. Be sure to enter your examination ID in the space provided.

Distribution A: 20 20 25 23 20 18 27 21 19 29

Distribution B: 81 100 90 100 100 63 100 92 54 82

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39 Your distributions have examination ID #39. Be sure to enter your examination ID in the space provided.

Distribution A: 29 28 18 24 24 26 14 21 23 20

Distribution B: 100 54 90 82 100 92 100 100 81 63

---

40 Your distributions have examination ID #40. Be sure to enter your examination ID in the space provided.

Distribution A: 30 18 23 17 18 25 16 19 23 22

Distribution B: 100 82 81 90 92 100 100 63 54 100

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41 Your distributions have examination ID #41. Be sure to enter your examination ID in the space provided.

Distribution A: 25 28 26 23 22 28 24 22 22 21

Distribution B: 82 100 100 100 54 81 90 100 63 92

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42 Your distributions have examination ID #42. Be sure to enter your examination ID in the space provided.

Distribution A: 29 22 22 22 27 24 24 29 22 27

Distribution B: 100 92 54 100 100 90 100 82 63 81

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43 Your distributions have examination ID #43. Be sure to enter your examination ID in the space provided.

Distribution A: 21 24 26 13 25 31 29 32 23 21

Distribution B: 63 92 54 100 82 90 100 81 100 100

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44 Your distributions have examination ID #44. Be sure to enter your examination ID in the space provided.

Distribution A: 30 33 25 29 33 22 27 14 27 31

Distribution B: 100 81 100 82 90 54 100 100 63 92

---

45 Your distributions have examination ID #45. Be sure to enter your examination ID in the space provided.

Distribution A: 29 30 25 28 28 30 28 27 27 30

Distribution B: 100 92 54 63 100 100 100 90 81 82

---

46 Your distributions have examination ID #46. Be sure to enter your examination ID in the space provided.

Distribution A: 27 27 28 28 29 24 33 24 26 20

Distribution B: 92 54 100 90 82 63 100 81 100 100

---

47 Your distributions have examination ID #47. Be sure to enter your examination ID in the space provided.

Distribution A: 34 26 27 26 27 27 29 22 23 28

Distribution B: 54 90 100 82 63 100 81 100 92 100

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48 Your distributions have examination ID #48. Be sure to enter your examination ID in the space provided.

Distribution A: 27 35 24 24 37 32 33 28 28 21

Distribution B: 54 100 90 63 100 81 82 100 92 100

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49 Your distributions have examination ID #49. Be sure to enter your examination ID in the space provided.

Distribution A: 22 22 24 24 20 26 24 24 22 25

Distribution B: 100 100 81 82 100 100 54 63 90 92

---

50 Your distributions have examination ID #50. Be sure to enter your examination ID in the space provided.

Distribution A: 19 20 16 16 24 23 23 19 21 25

Distribution B: 82 100 63 100 81 100 92 90 54 100

---

51 Your distributions have examination ID #51. Be sure to enter your examination ID in the space provided.

Distribution A: 19 18 21 24 24 19 21 19 27 16

Distribution B: 54 82 100 90 100 100 63 92 100 81

---

52 Your distributions have examination ID #52. Be sure to enter your examination ID in the space provided.

Distribution A: 21 24 25 20 22 16 21 25 21 28

Distribution B: 81 63 100 100 100 90 100 82 92 54

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53 Your distributions have examination ID #53. Be sure to enter your examination ID in the space provided.

Distribution A: 25 25 26 25 25 25 25 22 24 26

Distribution B: 90 81 100 54 82 63 100 100 100 92

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54 Your distributions have examination ID #54. Be sure to enter your examination ID in the space provided.

Distribution A: 25 26 28 28 26 21 20 23 21 27

Distribution B: 90 82 92 100 100 100 100 54 63 81

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55 Your distributions have examination ID #55. Be sure to enter your examination ID in the space provided.

Distribution A: 21 30 19 25 24 28 30 21 26 21

Distribution B: 82 100 63 81 54 100 100 100 92 90

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56 Your distributions have examination ID #56. Be sure to enter your examination ID in the space provided.

Distribution A: 31 29 20 24 19 19 23 31 22 30

Distribution B: 92 81 90 100 63 100 54 100 100 82

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57 Your distributions have examination ID #57. Be sure to enter your examination ID in the space provided.

Distribution A: 27 27 26 27 26 27 29 30 29 30

Distribution B: 100 63 82 100 92 81 100 90 54 100

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58 Your distributions have examination ID #58. Be sure to enter your examination ID in the space provided.

Distribution A: 29 24 32 31 31 22 30 30 31 24

Distribution B: 54 82 100 90 100 81 63 100 100 92

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59 Your distributions have examination ID #59. Be sure to enter your examination ID in the space provided.

Distribution A: 32 31 31 30 21 26 30 33 20 25

Distribution B: 81 100 82 100 92 54 100 63 90 100

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60 Your distributions have examination ID #60. Be sure to enter your examination ID in the space provided.

Distribution A: 21 22 25 25 36 29 29 26 37 31

Distribution B: 81 54 100 100 92 82 63 90 100 100

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61 Your distributions have examination ID #61. Be sure to enter your examination ID in the space provided.

Distribution A: 24 23 21 21 21 25 19 25 24 23

Distribution B: 81 100 63 100 92 82 100 54 100 90

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62 Your distributions have examination ID #62. Be sure to enter your examination ID in the space provided.

Distribution A: 26 24 19 21 26 22 24 21 21 22

Distribution B: 63 100 82 54 100 100 90 81 92 100

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63 Your distributions have examination ID #63. Be sure to enter your examination ID in the space provided.

Distribution A: 22 25 24 23 22 21 25 28 20 15

Distribution B: 100 90 54 82 63 81 100 92 100 100

---

64 Your distributions have examination ID #64. Be sure to enter your examination ID in the space provided.

Distribution A: 24 26 22 21 21 29 21 18 16 20

Distribution B: 54 63 90 100 100 92 100 81 100 82

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65 Your distributions have examination ID #65. Be sure to enter your examination ID in the space provided.

Distribution A: 25 25 24 26 24 23 23 24 26 28

Distribution B: 100 81 100 92 100 90 82 63 100 54

---

66 Your distributions have examination ID #66. Be sure to enter your examination ID in the space provided.

Distribution A: 29 29 28 29 22 27 25 28 21 30

Distribution B: 100 92 100 100 100 82 90 54 81 63

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67 Your distributions have examination ID #67. Be sure to enter your examination ID in the space provided.

Distribution A: 24 27 27 22 22 22 23 20 31 33

Distribution B: 81 92 100 82 63 100 100 54 90 100

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68 Your distributions have examination ID #68. Be sure to enter your examination ID in the space provided.

Distribution A: 33 27 29 20 26 24 21 22 25 29

Distribution B: 90 100 100 81 100 63 92 82 54 100

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69 Your distributions have examination ID #69. Be sure to enter your examination ID in the space provided.

Distribution A: 31 27 29 27 31 31 26 27 26 29

Distribution B: 90 100 81 100 100 63 82 54 92 100

---

70 Your distributions have examination ID #70. Be sure to enter your examination ID in the space provided.

Distribution A: 33 32 29 30 30 32 27 27 26 23

Distribution B: 92 90 100 100 100 63 81 82 100 54

---

71 Your distributions have examination ID #71. Be sure to enter your examination ID in the space provided.

Distribution A: 27 37 35 28 20 22 26 30 21 32

Distribution B: 90 100 100 92 63 100 100 81 54 82

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72 Your distributions have examination ID #72. Be sure to enter your examination ID in the space provided.

Distribution A: 14 31 25 27 27 29 24 28 25 28

Distribution B: 81 100 82 92 100 100 54 90 100 63

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73 Your distributions have examination ID #73. Be sure to enter your examination ID in the space provided.

Distribution A: 22 22 19 19 18 22 27 23 22 16

Distribution B: 92 63 100 100 100 100 54 82 81 90

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74 Your distributions have examination ID #74. Be sure to enter your examination ID in the space provided.

Distribution A: 23 16 25 21 24 22 18 21 22 27

Distribution B: 100 82 63 100 100 81 92 100 90 54

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75 Your distributions have examination ID #75. Be sure to enter your examination ID in the space provided.

Distribution A: 20 22 17 16 27 20 34 25 27 23

Distribution B: 100 54 90 100 100 100 82 81 63 92

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76 Your distributions have examination ID #76. Be sure to enter your examination ID in the space provided.

Distribution A: 24 21 22 18 18 14 18 28 24 31

Distribution B: 100 63 81 90 100 100 92 54 82 100

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77 Your distributions have examination ID #77. Be sure to enter your examination ID in the space provided.

Distribution A: 24 26 24 28 23 20 25 23 23 25

Distribution B: 100 90 100 100 81 100 63 92 82 54

---

78 Your distributions have examination ID #78. Be sure to enter your examination ID in the space provided.

Distribution A: 21 25 28 25 24 22 29 27 26 27

Distribution B: 100 90 54 92 100 100 81 100 82 63

---

79 Your distributions have examination ID #79. Be sure to enter your examination ID in the space provided.

Distribution A: 32 29 37 26 29 26 28 33 24 29

Distribution B: 100 100 81 90 92 82 54 63 100 100

---

80 Your distributions have examination ID #80. Be sure to enter your examination ID in the space provided.

Distribution A: 31 26 26 24 32 26 19 24 39 30

Distribution B: 54 100 92 90 82 100 100 81 100 63

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81 Your distributions have examination ID #81. Be sure to enter your examination ID in the space provided.

Distribution A: 30 26 26 27 28 27 26 28 29 28

Distribution B: 100 92 54 90 82 100 100 81 63 100

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82 Your distributions have examination ID #82. Be sure to enter your examination ID in the space provided.

Distribution A: 27 30 30 29 28 25 28 26 24 28

Distribution B: 92 90 100 100 100 100 82 63 54 81

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83 Your distributions have examination ID #83. Be sure to enter your examination ID in the space provided.

Distribution A: 27 30 28 28 32 24 23 29 28 26

Distribution B: 63 100 92 81 100 100 54 90 82 100

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84 Your distributions have examination ID #84. Be sure to enter your examination ID in the space provided.

Distribution A: 25 26 31 32 21 32 23 35 25 35

Distribution B: 54 100 100 100 63 92 100 82 90 81

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