We then proceed to solve the inequality.

$$\frac{72+x+77}{3} > 75$$
$$149+x > 225$$
$$x > 76$$

Thus, the high temperature on the second day exceeded 76 degrees.

b. The phrase "must not detect more than 5 defective wafers per batch on average" means the average number must be less than or equal to 5. Let x denote the maximum number of defective wafers in the last batch.

$$\frac{(9)(4.78)+x}{10} \leq 5$$
$$43.02+x \leq 50$$
$$x \leq 6.98$$

The number of defective wafers found in the first 9 batches is (9)(4.78) = 43.02.

Since it is not possible to have a fractional number of wafers, there must have been 43 defective wafers in the first 9 batches, so the maximum allowable number of defective wafers in the final batch is 7.

1.3 EXERCISES

PRACTICE

Determine which elements of $S = \{12, -9, 3.14, -2.83, 1, 5.24, 8, -3, 4\}$ satisfy each inequality below.

1. $7y - 33.6 < -8.6 + 2y$

2. $-2.2y - 18.8 \geq 5.2(1-y)$

3. $-40 < 4y - 8 \leq 4$

4. $-4 < -2(z-2) \leq 2$

Solve the following linear inequalities. Describe the solution set using interval notation and by graphing. See Examples 2 and 3.

5. $4 + 3t \leq t - 2$

6. $x - 7 \geq 5 + 3x$

7. $5y - 24 < -9.6 + 2y$

8. $-\frac{v+2}{3} > \frac{5-v}{2}$

9. $4.2x - 5.6 < 1.6 + x$

10. $8.5y - 3.5 \geq 2.5(3-y)$

11. $-2(3-x) < -2x$

12. $\frac{1-x}{5} > \frac{-x}{10}$

13. $4w + 7 \leq -7w + 4$

14. $-5(p-3) > 19.8 - p$

15. $\frac{6f-2}{5} < \frac{5f-3}{4}$

16. $\frac{u-6}{7} \geq \frac{2u-1}{3}$

17. $0.04n + 1.7 < 0.13n - 1.45$

18. $2k + \frac{3}{2} < 5k - \frac{7}{3}$

19. $\frac{4x+4}{5} > \frac{3x+2.6}{4}$

20. $-1.4z - 19.6 \geq 4.4(1-z)$

21. $6m + \frac{7}{4} > \frac{4m+5.8}{5}$

22. $-3.9n - 5.4 \geq 6.2(2-3n)$

Solve the following compound inequalities. Describe the solution set using interval notation and by graphing. See Examples 4 and 5.

23. $-4 < 3x - 7 \leq 8$

24. $5 \leq 2m - 3 \leq 13$

25. $-36 < 3x - 6 \leq 12$

26. $2 < 3(x+2) \leq 21$

27. $-8 \leq \frac{z}{2} - 4 < -5$

28. $6(x-1) < 2(3x+5) \leq 6x + 10$

29. $3 < \frac{w+3}{8} \leq 9$

30. $4 \leq \frac{p+7}{-2} < 9$

31. $\frac{1}{3} < \frac{7}{6}(l-3) < \frac{2}{3}$

32. $-10 < -2(4+y) \leq 9$

33. $\frac{1}{4} \leq \frac{g}{2} - 3 < 5$

34. $-1.2 \leq \frac{x+3}{-5} \leq 0.2$

35. $0.08 < 0.03c + 0.13 \leq 0.16$

Solve the following absolute value inequalities. Describe the solution set using interval notation and by graphing. See Example 6.

36. $|x-2| \geq 5$

37. $|4-2x| > 11$

38. $4 + |3-2y| \leq 6$

39. $4 + |3-2y| > 6$

40. $2|z+5| < 12$

41. $7 - \left|\frac{q}{2} + 3\right| \geq 12$

42. $4|z+3| \leq 28$

43. $-3|4-t| < -6$

44. $-3|4-t| > -6$

45. $3|4-t| < -6$

46. $7 - |4-2y| \leq -5$

47. $11 - \left|\frac{w}{4} + 1\right| \geq 12$

48. $5.5 + |x-7.2| \leq 3.5$

49. $6 - 5|x+2| \geq -4$

50. $|2x-1| < x + 4$

51. $|3t+4| > -8$

52. $2 < |6w-2| + 7$

The words "and" and "or" can appear explicitly between two inequalities, and their meaning in such cases is the same as in absolute value inequalities. If two inequalities are joined by the word "and," the solution set consists of all those real numbers that satisfy both inequalities; that is, the solution set overall is the intersection of the two individual solution sets. If the word "or" appears between two inequalities, the solution set consists of all those real numbers that satisfy at least one of the two inequalities; in other words, the solution set overall is the union of the two individual solution sets.

Guided by the above paragraph, solve the following inequality problems. Describe the solution set using interval notation and by graphing.

53. $t < 2t - 3$ and $-3(t+4) > -57$

54. $7 - \frac{3x}{5} < \frac{2}{5}$ or $2 - 3x \geq 5$

55. $-2(a-1) < 4$ and $6 + a \leq 9$

56. $-2(a-1) < 4$ and $6 - a \leq 9$

57. $-2(a-1) < 4$ or $6 + a \leq 9$

58. $\frac{5n+6}{3} < -10$ and $-3(n-1) < -6$

59. $\frac{23x-3}{-7} \leq 7$ and $-x < -(4x-9)$

60. $7 - \frac{x}{3} \leq 14 + \frac{x}{2}$ or $-3x < 15$

APPLICATIONS

61. In a class in which the final course grade depends entirely on the average of four equally weighted 100-point tests, Cindy has scored 96, 94, and 97 on the first three. The professor has announced that there will be a 15-point bonus problem on the fourth test, and anyone who finishes the semester with an average of more than 100 will receive an A+. What interval of scores on the fourth test will give Cindy an A for the semester (an average between 90 and 100, inclusive), and what interval will give Cindy an A+?

62. In a series of 30 racquetball games played to date, Larry has won 10, giving him a winning average so far of 33.3% (to the nearest tenth of a percent). If he continues to play, what interval describes the number of games he must now win in a row to have an overall winning average greater than 50%?

63. Assume that the national average SAT score for high school seniors is 1020 out of 1600. A group of seven students receive their scores in the mail, and six of them look at their scores. Two students scored 1090, one got an 1120, two others each got a 910, and the sixth student received an 880. What interval of scores can the seventh student receive to pull the group's average above the national average?

64. The central bank of a certain country tries to keep the inflation rate below 5.0% on an annual basis. Assume that inflation rates for the first three quarters of a given year are as follows: 5.2%, 4.3%, and 4.7%. What interval of inflation rates for the final quarter would satisfy the government's goal?