Determine whether the given ordered pair is a solution of the given system of equations.

1) \((-4, -6)\); \[
\begin{align*}
x + y &= -10 \\
x - y &= 2
\end{align*}
\]

2) \((-4, 5)\); \[
\begin{align*}
x + y &= 9 \\
x - y &= -1
\end{align*}
\]

3) \(\left(\frac{7}{2}, -\frac{7}{2}\right)\); \[
\begin{align*}
x - y &= 0 \\
x + y &= 7
\end{align*}
\]

Solve the system graphically.
Determine whether the graph shows a consistent system with independent equations, a consistent system with dependent equations, or an inconsistent system with independent equations.

5)

6)

Determine the nature of the system of equations.

7) \[
\begin{align*}
2x + 2y &= -2 \\
5x + 6y &= 2
\end{align*}
\]

8) \[
\begin{align*}
2x + 3y &= 38 \\
3x + 5y &= 62
\end{align*}
\]
Solve the problem.

9) After retirement, Kelly's company offers her two options for receiving her retirement pension. According to the first plan, she will receive monthly payments from a variable annuity that initially pays $700 per month then decreases each month at a rate of $25 per month per year. Optionally, she may choose a plan that pays her a fixed amount of $500 per month for the rest of her life. The monthly payments for the two plans are illustrated in the graph below. After how many years does the variable plan pay less per month than the fixed plan?

Provide an appropriate response.

10) If the $y$ term is missing in only one of two linear equations, the lines are ________.

11) Decide if the system has one solution, no solution, or an infinite number of solutions.
   \[ 3x - y = 4 \]
   \[ x + 2y = 6 \]

12) When two linear equations are solved for $y$ and the slopes are equal and the $y$-intercepts are the same, the lines are ________.

13) When two linear equations are solved for $y$ and the slopes are different and the $y$-intercepts are equal, the lines are ________.

14) Describe the graph of an independent system of two linear equations in two variables.

15) Describe the graph of a consistent system of two linear equations in two variables.

16) Explain in your own words what it means for a system of two linear equations in two variables to be dependent.
17) Is it possible for a system of two linear equations in two variables to be both inconsistent and dependent? Why or why not?

Solve the system of equations using substitution. Note that the system may be inconsistent or consistent with dependent equations.

18) \[
\begin{align*}
7 - 4y &= -54 \\
y &= -2x
\end{align*}
\]

19) \[
\begin{align*}
y &= 3x - 3 \\
4x + y &= -17
\end{align*}
\]

20) \[
\begin{align*}
y &= 13 - 3x \\
9y + 2x &= -8
\end{align*}
\]

21) \[
\begin{align*}
y &= 5x - 1 \\
y &= 5x + 4
\end{align*}
\]

22) \[
\begin{align*}
x + 4y &= -34 \\
-6x + 3y &= 15
\end{align*}
\]

23) \[
\begin{align*}
x - 5y &= 25 \\
-2x - 4y &= 20
\end{align*}
\]

24) \[
\begin{align*}
x + 2y &= -3 \\
7x + 3y &= -21
\end{align*}
\]

25) \[
\begin{align*}
3x + y &= -3 \\
5x &= -2y
\end{align*}
\]

Translate the problem to a system of equations, then solve.

26) The sum of two numbers is 43. One number is 1 more than the other. Find the numbers.

27) Find two numbers for which the sum is 33 and the difference is 11.

28) The sum of two numbers is 80. The larger number is three times the smaller number. Find the numbers.
29) The difference between two numbers is 64. Five times the smaller number equals the larger number. Find the numbers.

30) The sum of two numbers is 72. Four times the larger number minus three times the smaller number is 78. What are the numbers?

31) Gloria collected 17 fantail and comet goldfish. There were 5 fewer fantails than comets. How many comets did Gloria have?

32) The two largest oil spills together released 275 million gallons of oil into the oceans. The smaller of the two released 27 million gallons less than the larger of the two. How many million gallons did the larger one release?

33) A biologist collected 276 fern and moss samples. There were 56 fewer ferns than moss samples. How many fern samples did the biologist collect?

34) The perimeter of a rectangle is 36 cm. One side is 10 cm longer than the other side. Find the lengths of the sides.

35) The perimeter of a rectangle is 76 m. If the widths were doubled and the lengths were increased by 19 m, the perimeter would be 144 m. What are the length and width of the rectangle?

36) The perimeter of a triangle is 37 cm. The triangle is isosceles now, but if its base was lengthened by 4 cm and each leg was shortened by 4 cm, it would be equilateral. Find the base of the original triangle.

37) The perimeter of a rectangle is six times its width. If the length was increased by 4 inches and the width by 7 inches; then the perimeter would be 160 inches. Find the width.

38) Bob fenced in a rectangular garden in his yard. The length of the rectangle is 7 feet longer than the width, and the perimeter is 82 feet. What is the width of the rectangle?

Solve the system of equations using the elimination method.

39) \[
\begin{align*}
x + y &= 9 \\
x - y &= -3
\end{align*}
\]

40) \[
\begin{align*}
-x + 6y &= 7 \\
-2x - 6y &= -22
\end{align*}
\]
41) \[
\begin{align*}
  x - 4y &= -25 \\
  2x + 4y &= 10 \\
\end{align*}
\]

42) \[
\begin{align*}
  3x - y &= 11 \\
  2x + y &= 9 \\
\end{align*}
\]

43) \[
\begin{align*}
  4x - 3y &= -2 \\
  12x - 9y &= 6 \\
\end{align*}
\]

44) \[
\begin{align*}
  0.3x + 0.6y &= 1.2 \\
  -0.3x - 0.1y &= -0.7 \\
\end{align*}
\]

45) \[
\begin{align*}
  \frac{1}{3}x - \frac{1}{4}y &= 1 \\
  \frac{2}{3}x + \frac{1}{2}y &= 3 \\
\end{align*}
\]

Translate the problem to a system of equations, then solve using the elimination method.

46) The sum of two numbers is 51 and their difference is 5. Find the numbers.

47) Find two numbers whose sum is 31 and whose difference is 1.

48) The perimeter of a rectangle is 48 cm. One side is 12 cm longer than the other side. Find the lengths of the sides.

49) The perimeter of a rectangle is 36 m. If the widths were doubled and the lengths were increased by 11 m, the perimeter would be 70 m. What are the length and width of the rectangle?

50) Best Rentals charges a daily fee plus a mileage fee for renting its cars. Barney was charged $111 for 3 days and 300 miles, while Mary was charged $193 for 5 days and 600 miles. What does Best Rental charge per day and per mile?

51) A salesman sold $350 more than the rest of the sales staff combined. If the sales total for the day was $1000, then how much did the rest of the sales staff sell?

52) A shopkeeper ordered a total of 36 lb of cashews and peanuts. If he ordered 30 less pounds of cashews than peanuts, then how many pounds of peanuts did he order?
53) One rental agency rents a van for $27.00 per day plus $0.17 per mile. A competitor rents a truck for $18.00 per day plus $0.20 per mile. For what mileage is the cost the same for renting the van one day? Round your answer to the nearest tenth of a mile.

54) South Wind Vineyards uses 840 acres to plant Chardonnay and Riesling grapes. The vintner knows the profits will be greatest by planting 230 more acres of Chardonnay than Riesling. How many acres of each grape should be planted?

55) The annual salaries of a software engineer and a project supervisor total $191,100. If the project supervisor makes $14,100 more than the software engineer, find each of their salaries.

56) Two angles have a sum of 90°. Their difference is 14°. Find the angles.

57) The sum of two angles is 70°. One angle is 23° less than twice the other. Find the angles.

58) Two angles are supplementary, and one is 40° more than three times the other. Find the smaller angle.

59) Two angles are supplementary, and one is 5° more than six times the other. Find the larger angle.

60) Two angles are complementary. Twice one angle plus the other is 115°. Find the measure of each angle.

61) Two angles are complementary. One angle is 54° more than twice the other. Find the measure of each angle.

62) In a right triangle, one acute angle is 54° more than twice the other. Find each acute angle.
Graph the solution of the system.

63) \[
\begin{aligned}
2x + y &\leq 4 \\
x - 1 &\geq 0
\end{aligned}
\]

64) \[
\begin{aligned}
2x + y &\leq 4 \\
y - 1 &\leq 0
\end{aligned}
\]

65) \[
\begin{aligned}
3x - 2y &\leq 6 \\
x - 1 &\geq 0
\end{aligned}
\]
66) \[
\begin{align*}
&x + 2y \leq 2 \\
&x + y \geq 0
\end{align*}
\]

67) \[
\begin{align*}
&x - 2y \leq 2 \\
&x + y \leq 0
\end{align*}
\]

68) \[
\begin{align*}
&x + 2y \geq 2 \\
&x - y \leq 0
\end{align*}
\]
69) \[
\begin{align*}
3x &< -2y \\
3x + 2y &\geq -5
\end{align*}
\]

70) \[
\begin{align*}
2x + 3y &\leq 6 \\
x - y &\geq 3 \\
y &\leq 2
\end{align*}
\]
Explain the mistake in the graph.

71)

\[
\begin{cases}
  x + y < 0 \\
  x - y \geq -6
\end{cases}
\]

72)

\[
\begin{cases}
  x + y < 3 \\
  x - y \geq 1
\end{cases}
\]

Solve the problem.

73) Bruce is a retired carpenter who builds patio chairs and dog houses, which he sells at his local flea market. It takes him 3 hours to build a dog house and 4 hours to build a patio chair. Bruce can work no more than 25 hours per week, and he must produce more chairs than dog houses. Write a system of inequalities to describe this situation. Use D for the number of dog houses and P for the number of patio chairs produced in a week.
Answer Key
Testname: REVIEW # 3

1) Yes
2) No
3) No
4) (3, -1)
5) Consistent with independent equations
6) Inconsistent with independent equations
7) Consistent with independent equations
8) Consistent with independent equations
9) 8 years
10) Intersecting
11) One solution
12) One Graph
13) Intersecting
14) The graph is a pair of lines that intersect at exactly one point, or a pair of parallel lines.
15) The graph is a single line (the equations have the same graph) or a pair of lines that intersect at exactly one point.
16) One equation can be obtained by multiplying both sides of the other equation by a nonzero constant, and thus the equations are equivalent. Therefore, the graph of the system is a single line, and every point on the line is a solution of the system. This means that the system has infinitely many solutions.
17) No, it is not possible for a system of two linear equations in two variables to be both inconsistent and dependent. An inconsistent system of equations has no solution, but a dependent system has an infinite number of solutions. The graph of an inconsistent system of two linear equations in two variables is two parallel lines, while the graph of a dependent system of two linear equations in two variables is a single line.
18) (−6, 12)
19) (−2, −9)
20) (5, −2)
21) No solution
22) (−6, −7)
23) (0, −5)
24) (−3, 0)
25) (−6, 15)
26) 21, 22
27) 11, 22
28) 20, 80
29) 16, 80
30) 30, 42
31) 11 comets
32) 151 million gal
33) 110 fern samples
34) 4 cm, 14 cm
35) width 15 m, length 23 m
36) 7 cm
37) 23 in.
38) 17 feet
39) (3, 6)
40) (5, 2)
41) (−5, 5)
42) (4, 1)
43) No solution
44) (2, 1)
Answer Key
Testname: REVIEW # 3

45) \(\left(\frac{15}{4}, 1\right)\)
46) 23 and 28
47) 16 and 15
48) 6 cm, 18 cm
49) Width 6 m, length 12 m
50) $29 per day, 8¢ per mile
51) $325
52) 33 lb
53) 300.0 miles
54) Riesling: 305 acres; Chardonnay: 535 acres
55) Software engineer: $88,500; project supervisor: $102,600
56) 52° and 38°
57) 31° and 39°
58) 35°
59) 155°
60) 25°, 65°
61) 12°, 78°
62) 12° and 78°

63) [Diagram]

64) [Diagram]
71) $x + y < 0$ should be a dotted line.
72) $x + y < 3$ is shaded on the wrong side.
73) \[
P > D \\
4P + 3D \leq 25
\]