1

Section 9.1 Systems of Linear Equations in Two Variables

1. If (a, b) is the solution of the system

$$\begin{cases} 6x + 7y = -4 \\ 2x + 5y = 4 \end{cases}$$

then $a + b$ is equal to

(a) -1

(b) 3

(c) -2

(d) $\frac{3}{2}$

(e) $-\frac{1}{2}$

2. Given that the lines with equations $3x - 2y = 12$ and $2x - 3y = 13$ and $5x + ky = 19$ intersect at the same point, the number k satisfies

A) $k = -3$

B) $k \neq -\frac{15}{2}$

C) $k = 2$

D) $k = -\frac{15}{2}$

E) $k \neq -\frac{15}{2}$ and $k \neq -2$

②

3\. If (A, B) is the solution of the system of equations:

$3y = 2x - 18$

$7x = -3 - 6y$

Then $A + B =$

A) 14

B) 0

C) $-\frac{3}{10}$

D) -13

E) -1

4\. If $2x + 5 = 6x + k = 4x - 7$, then $k =$

(a) -19

(b) -17

(c) -23

(d) -47

(e) -15

3

5. If (a,b) is the solution of the system

$$\begin{cases} 3x - 4y = 6 \\ 2x + 3y = 5 \end{cases}$$

then $a+b$ is equal to:

a) $\frac{41}{17}$

b) $-\frac{35}{17}$

c) $\frac{35}{17}$

d) $\frac{38}{17}$

e) $-\frac{38}{17}$

6. If (x,y) is the solution of the system of equations $\begin{cases} 2x - 5\pi y = 3 \\ 3x + 4\pi y = 2 \end{cases}$,

then $x + \pi y =$

a) $\frac{17}{23}$

b) $\frac{15}{23}$

c) 1

d) $\frac{13}{23}$

e) $\frac{19}{23}$

④

7. If (a,b) is the solution of the system of equations $\begin{cases} 2\sqrt{2}x + 3\sqrt{5}y = 7 \\ 3\sqrt{2}x - \sqrt{5}y = -17 \end{cases}$,

then $ab =$

A) $-4\sqrt{5}$

B) $4\sqrt{10}$

✓ C) $-2\sqrt{10}$

D) $2\sqrt{10}$

E) -20

8. If (x, y) is a solution of the system:

$$2\sqrt{2}x + 3\sqrt{5}y = 7$$
$$3\sqrt{2}x - \sqrt{5}y = -17$$

Then y is equal to:

a) $-2\sqrt{5}$
b) $-\sqrt{5}$
c) $4\sqrt{5}$
d) $2\sqrt{5}$
● $\sqrt{5}$

9. If the system of equations $\begin{cases} 2x + 5y + A = 0 \\ 3x - By = 2 \end{cases}$ has an infinite number of solutions, then $A+B$ is equal to

A) $-\frac{53}{6}$

B) $-\frac{17}{4}$

C) $-\frac{19}{3}$

D) -12

E) -25

10. The value of the constant k for which $3x+7=5x+4k=7x-1$ is equal to :

a) $-\frac{5}{4}$

b) $\frac{9}{4}$

c) $\frac{3}{4}$

d) $\frac{5}{2}$

e) $\frac{11}{4}$

11. The set of all values of k for which the system $\begin{cases} 3x+ky=11 \\ 2x+4y=9 \end{cases}$ has a unique solution is

A) $\{k \mid k \le 6\}$

B) $\{6\}$

C) $\{k \mid k \ge 6\}$

D) $\left\{k \mid k \ne \frac{3}{2}\right\}$

E) $\{k \mid k \ne 6\}$

12. If the lines whose equations are $2x+3y=1$, $x=3y+5$ and $kx+3y=3$ all intersect at the same point. Then the value of k is:

A) 3

B) -2

C) 4

D) 0

E) -1

⑥

13. The system

$$u + 2v = 1$$
$$2u + a^2 v = a$$

has exactly one solution if

(a) $a = 2$ and $a \neq -2$
(b) $a \neq 2$
(c) $a = -2$ and $a \neq 2$
(d) $a \neq 2$ and $a \neq -2$
(e) $a \neq -2$

14. The solution set of the following system is

$$\begin{cases} \dfrac{6}{x} + \dfrac{2}{y} = 8 \\ \dfrac{9}{x} + \dfrac{5}{y} = 16 \end{cases}$$

(a) $\left\{\left(\frac{3}{2}, \frac{1}{2}\right)\right\}$

(b) $\left\{\left(\frac{2}{3}, 2\right)\right\}$

(c) $\left\{\left(2, \frac{3}{2}\right)\right\}$

(d) $\left\{\left(\frac{1}{2}, \frac{3}{2}\right)\right\}$

(e) $\left\{\left(\frac{3}{7}, \frac{-1}{4}\right)\right\}$

15. If $x = a$ and $y = b$ satisfy the system of the equations

$$\frac{1}{x} - \frac{2}{y} = 3$$

$$\frac{3}{x} + \frac{4}{y} = 14$$

then $a + b$ is equal to

(a) 0

(b) $\frac{7}{4}$

(c) $\frac{9}{4}$

(d) $-\frac{3}{2}$

(e) -6

16. If (a, b) is the solution of the system of equations $\begin{cases} \frac{2x-1}{3} + \frac{y+2}{4} = 4 \\ \frac{x+3}{2} - \frac{x-y}{3} = 3 \end{cases}$,

then $a - b =$

A) 1

B) 7

C) 5

✓D) 3

E) 2

17. The perimeter of a rectangle is 90 meters; if the length is twice the width then the area of the rectangle is equal to

A) 900 square meters

B) 300 square meters

C) 1800 square meters

✓D) 450 square meters

E) 225 square meters

1

Section 9.3 Nonlinear Systems of Equations

1. The graphs of the line $3x - y = 0$ and the hyperbola $9x^2 - 4y^2 = 36$:

a) intersect at more than four points
b) intersect at one point only
c) intersect at two points only
d) intersect at four points
e) do not intersect

2. If x^2 and y^2 are eliminated from the system

$$\begin{cases} (x+2)^2 + (y-3)^2 = 10 \\ (x-3)^2 + (y+1)^2 = 13 \end{cases}$$

, we get :

a) $x + 4y + 3 = 0$

b) $5x + 11y + 9 = 0$

c) $11x + 4y + 3 = 0$

d) $5x - 4y + 3 = 0$

e) $3x - 4y + 7 = 0$

②

3. The graphs of the equations

$$\frac{(x-2)^2}{4}+y^2=1 \quad \text{and} \quad (x-1)^2-y^2=1$$

intersect at :

a) two points

b) four points

c) one point

d) three points

e) no point

4. The solution set of the following system is

$$(x-2)^2+(y+3)^2=20$$
$$(x-3)^2+(y+2)^2=10$$

(a) $\{(4,1),\ (6,-1)\}$

(b) $\{(-4,1),\ (6,1)\}$

(c) $\{(2,1),\ (3,-1)\}$

(d) $\{(-2,1),\ (-3,1)\}$

(e) $\{(3,-1),\ (5,-2)\}$

3

5. The number of real solutions of the nonlinear system

$$\begin{cases} x^2+y^2=1 \\ \dfrac{(x+1)^2}{4}-y^2=1 \end{cases}$$

is equal to

(a) 1

(b) 2

(c) 3

(d) 4

(e) 0

6. If (a,b) and (c,d) are the solutions of the system $\begin{cases}(x-1)^2+(y+1)^2=5\\(x+1)^2+(y-1)^2=1\end{cases}$, then $a+b+c+d$ is equal to:

a) 0

b) -2

c) 2

d) -1

e) 1

④

7. If (a,b) and (c,d) are the solutions of the system

$$\begin{cases}(x-1)^2+(y-2)^2=4\\ \dfrac{(x-1)^2}{4}+\dfrac{(y-2)^2}{9}=1\end{cases}$$

then $a+b+c+d=$

✓a) 6

b) 10

c) 12

d) 8

e) 4

8. The system of equations $\begin{cases}2x^2+3y^2=5\\ x^2-3y^2=4\end{cases}$ has

A) one real solution

B) three real solutions

C) four real solutions

D) two real solutions

✓E) no real solutions

5

9. If the system $\begin{cases} 3(x-1)^2 - 2(y+1)^2 = 19 \\ (x-1)^2 - (y+1)^2 = 5 \end{cases}$ has a solution (a,b) in the **first Quadrant**, then $a+b =$

A) -5

B) 1

C) 5

D) -3

E) 2

10. The number of intersections in the graphs of the equations $x^2 - 3y^2 = 4$ and $\frac{2}{3}x^2 + \frac{2}{3}y^2 = 1$ is

A) 4

B) 0

C) 3

D) 2

E) 1

11. **The number of intersection points of the graphs of the equations $4 + 3y^2 = x^2$ and $2x^2 - 5 = -3y^2$ is equal to:**

a) 0

b) 1

c) 2

d) 3

e) 4

6

12. If (a, b) and (c, d) are the solutions of the system $\begin{cases} x^2 - 3xy + y^2 = 4 \\ x^2 - 5xy + 6y^2 = 0 \end{cases}$, then $ac + bd$ =

A) -12

B) -40

C) -10

D) -36

E) -20

13. The number of solutions of system

$$\begin{cases} \dfrac{x^2}{4} + \dfrac{y^2}{9} = 1 \\ (x+1)^2 - y^2 = 1 \end{cases}$$

is equal to: (Hint: Sketch the graphs of the equations)

a) 3

b) 4

c) 2

d) 1

e) 0