

**Sheet 327: Linear and Quadratic Systems Review 2**

**For each problem, do all of these:** a) Write down each of the “y =” equations. b) Sketch. c) Find all intersections (**if any**).

1.

$$\begin{cases} y^2 - 4x + 11 = 0 \\ -\frac{1}{2}x + y = -\frac{1}{2} \end{cases}$$

2.

$$\begin{cases} x^2 + y^2 = 25 \\ 3x^2 - 16y = 0 \end{cases}$$

3.

$$\begin{cases} x^2 + y^2 = 25 \\ (x - 8)^2 + y^2 = 41 \end{cases}$$

4.

$$\begin{cases} 3x - 2y = 0 \\ x^2 - y^2 = 4 \end{cases}$$

5.

$$\begin{cases} x - 2y = 4 \\ x^2 - y = 0 \end{cases}$$

Name \_\_\_\_\_

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Always show work. For calculator questions, show the matrices used.

Graphing calculator not allowed

1.  $\begin{vmatrix} 4 & 1 \\ 3 & 2 \end{vmatrix}$

2.  $\begin{vmatrix} -2 & 2 & 3 \\ 5 & 0 & 1 \\ 6 & -4 & -4 \end{vmatrix}$

3. Solve using Cramer's Method.  $x + 6y = -9$   
 $x - 3y = 6$

4. Solve using the inverse matrix.  $-3a + b = -3$   
 $5a - 2b = 10$

Graphing calculator allowed

5.  $4x + y = -7$   
 $x - 2z = 4$   
 $3y + 2z = -3$

6. A local theater charges for \$2.25 for general admission and \$3.50 for box office seats. For a certain performance, 165 tickets were sold, which brought in a total of \$482.50. Find out how many of each type of ticket were sold.

7. From two kinds of corn meal, one costing \$0.65/kg and the other \$0.85/kg, a cattle farmer wishes to make a 100 kilogram mixture costing \$0.76/kg. How many kilograms of each kind should be used?

8. An airline maintains three different classes of service in a Boeing 747: first, business, and economy. The configuration of the plane (number of seats in each class) is based on demand. There are 42 seats available for either first or business class, and 570 seats for either business or economy class. If, on a certain flight, there are 34 times as many economy as first class seats, what is the configuration of the plane?

**Answer**

76 general, 89 box  
55 kg at \$0.85, 45 kg at \$0.65  
16 first class, 26 business, 544 economy

5.  $(-2, 1, -3)$   
4.  $(-4, -15)$   
3.  $(1, -\frac{3}{5})$   
2.  $-16$   
1.  $5$

Name \_\_\_\_\_

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State the first 5 terms of the sequence whose  $n$ th term is given by  $a_n$ .

1.  $a_n = -\frac{3}{n}$

State the next 2 terms of the sequence and give a formula for the  $n$ th term.

2. 63, 54, 45, 36, 27

Find the sum.

3.  $\sum_{n=1}^4 n^4$

Express using sigma notation.

4.  $1 - \frac{1}{3} + \frac{1}{9} - \frac{1}{27} + \frac{1}{81} - \frac{1}{243}$

5. State the 8th term of the geometric sequence  $-9, \frac{9}{2}, -\frac{9}{4}, \dots$

6. The first 3 terms of an arithmetic progression are  $-15, -17$ , and  $-19$ . Find the 22nd term and the sum of the first 22 terms.

7. How many terms of the arithmetic series  $(-15) + (-8) + (-1) + \dots$  must be added to give a sum of 801?

8. Find the sum of the first 6 terms of the geometric series  $80 + (-20) + 5 + \dots$ .

9.  $\frac{1}{2} + \left(-\frac{1}{4}\right) + \frac{1}{8} + \dots$

10. A log pile has 61 logs in the bottom layer, 58 in the second layer, 55 in the third layer, and so on. If there are 639 logs in the pile, how many layers are there?

11. After the first swing, the path of a pendulum bob is 0.9 as long as long as the previous swing. If the first swing is 50 cm long, how far does the bob travel on the sixth swing? What total distance does the bob travel in those six swings?

12. **Formulas**

■ Arithmetic sequences and series:

$$a_n = a_1 + (n-1)d \text{ and } S_n = n \left( \frac{a_1 + a_n}{2} \right).$$

■ Geometric sequences and series:

$$a_n = a_1(r)^{n-1} \text{ and } S_n = a_1 \left( \frac{1-r^n}{1-r} \right), \text{ and}$$

$$\text{for } n \rightarrow \infty \text{ with } |r| < 1, S = a_1 \left( \frac{1}{1-r} \right).$$

## Formulas

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- Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

- Cramer's Method:

$$x = D_x/D$$

$$y = D_y/D.$$

- Inverse Matrix:

If  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ , then

$$A^{-1} = \frac{1}{|A|} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$