

Solving Systems and Transforming the Plane

Grade 12 – Precalculus math · Test · Standards: A-REI.C.8, A-REI.C.9, N-VM.C.11, N-VM.C.12

Name: _____ Date: _____ Class: _____

This 45-minute test has 8 questions worth 20 points. Show the determinant and inverse for each system, and write exact answers. A calculator may be used for arithmetic only.

Standards: A-REI.C.8, A-REI.C.9, N-VM.C.11, N-VM.C.12 · **Level:** Grade 12 Precalculus

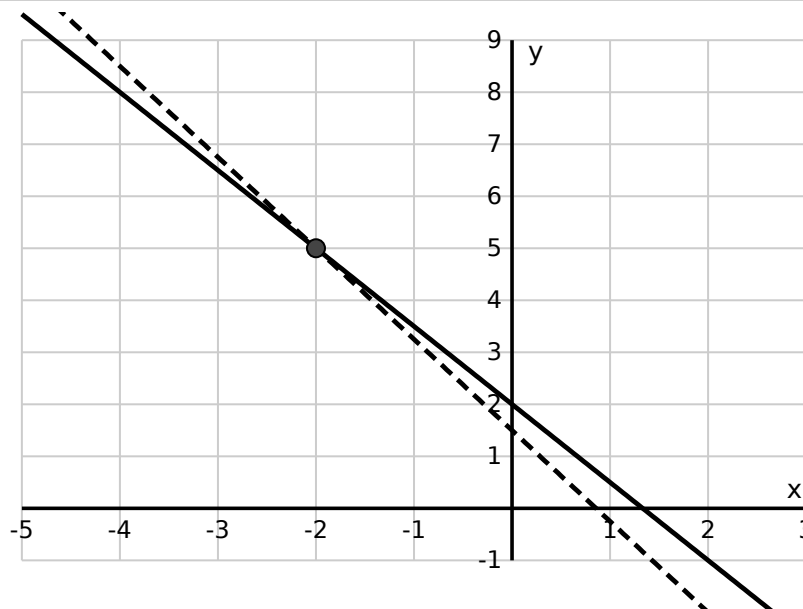
Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 From Equations to Matrices (3 points)

Consider the system $3x - 5y = -4$ and $2x + y = 7$.

- Write the system as $AX = B$ and state A , X and B . (1 point)
- Find $\det A$. (1 point)
- Does the system have a unique solution? Explain. (1 point)

Question 2 Solve Using an Inverse (3 points)



The graph of the system.

The figure shows the graph of $3x + 2y = 4$ and $7x + 4y = 6$. Solve the system using an inverse matrix.

Question 3 Type of Solution Set (2 points)

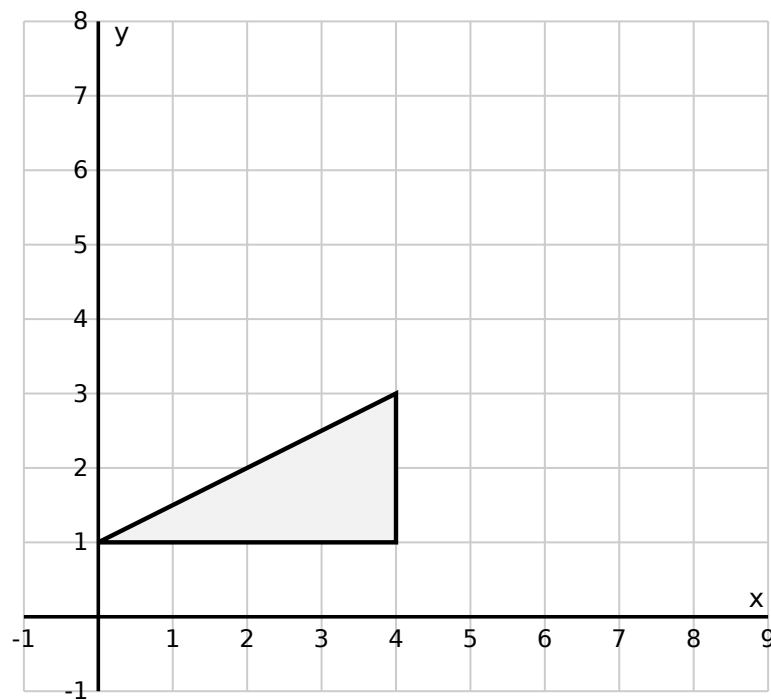
Consider $4x - 6y = 10$ and $-6x + 9y = -15$.

- Find the determinant of the coefficient matrix. (1 point)
- Describe the solution set and explain. (1 point)

Question 4 Images of Points (2 points)

The matrix M has rows $(2, -1)$ and $(0, 3)$. Find the images of $(4, -2)$ and $(-1, 5)$.

Question 5 A Triangle Transformed (3 points)



The triangle before the transformation.

The triangle in the figure is transformed by the matrix with rows $(2, 0)$ and $(1, 1)$.

- Find the images of the three vertices. (1 point)
- Find the determinant and the area of the image triangle. (2 points)

Question 6 Matrices from Descriptions (2 points)

- The matrix with rows $(1, 0)$ and $(0, -1)$ reflects points in the x -axis. Find the image of $(-3, 7)$. (1 point)
- Write the matrix of the 90° clockwise rotation by finding where $(1, 0)$ and $(0, 1)$ go. (1 point)

Question 7 Snack Bar Prices (3 points)

On Monday a snack bar sold 6 bagels and 2 juices for \$18.00. On Tuesday it sold 5 bagels and 3 juices for \$17.00.

- a. Write a matrix equation for the prices b and j . (1 point)
- b. Solve it with an inverse matrix, and state the price of each item. (2 points)

Question 8 Singular System (2 points)

For the system $3x + ky = 9$ and $2x + 4y = 5$, find the value of k that gives no unique solution. Then decide whether the system has no solution or infinitely many for that k .