MATHEMATICS MCQ BOOKLET

Grade 10 · Chapter 3 · Matrices and Determinants

FBISE / National Book Foundation Model Textbook companion

by Public Library

Independent MCQs on matrix definition and types, matrix addition and scalar multiplication, matrix multiplication and its properties, determinants, adjoint and inverse, and solving 2 × 2 linear systems by inversion and Cramer's rule. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. A matrix is a rectangular arrangement of numbers written in:

(A) rows and columns
(B) one row only
(C) alphabetical order only
(D) a single column with no rows

Correct Answer: A

Explanation: Entries are placed in horizontal rows and vertical columns.

2. The order (or dimension) of a matrix with m rows and n columns is written:

(A) n × m
(B) m × n
(C) m + n
(D) mn as a single integer only

Correct Answer: B

Explanation: Order is always rows first, then columns: m × n.

3. In the symbol a_ij, the subscripts i and j refer respectively to:

(A) column and row
(B) determinant and inverse
(C) row and column
(D) scalar and identity

Correct Answer: C

Explanation: The first index is the row number; the second is the column number.

4. A matrix of order 4 × 3 has how many elements in total?

(A) 7
(B) 9
(C) 64
(D) 12

Correct Answer: D

Explanation: 12 — this correctly answers the question.

5. Which matrix is square?

(A) 3 × 3
(B) 2 × 3
(C) 1 × 4
(D) 5 × 1

Correct Answer: A

Explanation: 3 × 3 — this correctly answers the question.

6. A matrix with 2 rows and 5 columns is best described as:

(A) square
(B) rectangular

(C) scalar
(D) identity

Correct Answer: B

Explanation: When rows ≠ columns the matrix is rectangular (non-square).

7. The null (zero) matrix O has the property that:

(A) every entry is 1
(B) diagonal entries are 0 only
(C) every entry is 0
(D) it has no order

Correct Answer: C

Explanation: The null (zero) matrix O has the property that every entry is 0.

8. In a diagonal matrix, the only non-zero entries (if any) lie on:

(A) the anti-diagonal only
(B) every off-diagonal position
(C) the first row only
(D) the main diagonal from top-left to bottom-right

Correct Answer: D

Explanation: Off-diagonal entries are zero; the main diagonal may hold non-zero values.

9. A scalar matrix is a diagonal matrix whose diagonal entries are:

(A) all equal to the same number k
(B) all different
(C) always zero
(D) always ±1 only

Correct Answer: A

Explanation: Every diagonal element equals the same scalar k; off-diagonals are 0.

10. The 2 × 2 identity matrix I□ equals:

(A) [[0, 1], [1, 0]]
(B) [[1, 0], [0, 1]]
(C) [[1, 1], [1, 1]]
(D) [[0, 0], [0, 0]]

Correct Answer: B

Explanation: Ones on the main diagonal and zeros elsewhere define I□.

11. For any matrix A of compatible order, A + O equals:

(A) O
(B) I
(C) A
(D) −A

Correct Answer: C

Explanation: For any matrix A of compatible order, A + O equals A.

12. For any square matrix A, A · I equals:

(A) O
(B) I only when A is diagonal
(C) A^2 always
(D) A

Correct Answer: D

Explanation: For any square matrix A, A · I equals A.

13. Two matrices can be added only when they have:

(A) the same order (same number of rows and columns)
(B) the same number of rows only

(C) equal determinants
(D) reciprocal entries

Correct Answer: A

Explanation: Corresponding entries are added only when both matrices share the same order.

14. If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then A + B equals:

(A) [[4, 4], [4, 4]]
(B) [[6, 8], [10, 12]]
(C) [[5, 12], [21, 32]]
(D) [[6, 7], [10, 12]]

Correct Answer: B

Explanation: If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then A + B equals [[6, 8], [10, 12]].

15. If A = [[9, −1], [4, 2]] and B = [[3, 5], [−4, 6]], then A − B equals:

(A) [[12, 4], [0, 8]]
(B) [[6, 6], [8, 4]]
(C) [[6, −6], [8, −4]]
(D) [[12, −6], [8, −4]]

Correct Answer: C

Explanation: If A = [[9, −1], [4, 2]] and B = [[3, 5], [−4, 6]], then A − B equals [[6, −6], [8, −4]].

16. If A = [[2, −3], [0, 5]], then −A equals:

(A) [[2, 3], [0, 5]]
(B) [[−2, −3], [0, −5]]
(C) [[0, 0], [0, 0]]
(D) [[−2, 3], [0, −5]]

Correct Answer: D

Explanation: Negating a matrix negates every entry, so the correct choice is [[−2, 3], [0, −5]].

17. If k = 3 and A = [[1, 4], [2, −1]], then kA equals:

(A) [[3, 12], [6, −3]]
(B) [[4, 7], [5, 2]]
(C) [[3, 4], [2, −1]]
(D) [[1, 12], [6, −3]]

Correct Answer: A

Explanation: If k = 3 and A = [[1, 4], [2, −1]], then kA equals [[3, 12], [6, −3]].

18. If A = [[−2, 0], [1, −4]] and k = −1, then kA equals:

(A) [[−2, 0], [1, −4]]
(B) [[2, 0], [−1, 4]]
(C) [[2, 0], [1, 4]]
(D) [[−2, 0], [−1, 4]]

Correct Answer: B

Explanation: If A = [[−2, 0], [1, −4]] and k = −1, then kA equals [[2, 0], [−1, 4]].

19. Matrix multiplication AB is defined when:

(A) A and B have the same order
(B) A is square and B is square
(C) the number of columns of A equals the number of rows of B
(D) A and B are both 1 × 1

Correct Answer: C

Explanation: The inner dimensions must match: (m×n)(n×p) → (m×p).

20. For A = [[1, 2]] (1×2) and B = [[3], [4]] (2×1), the product AB is a:

(A) 2 × 2 matrix
(B) 2 × 1 matrix

(C) undefined product
(D) 1 × 1 matrix

Correct Answer: D

Explanation: (1×2)(2×1) yields a single number arranged as 1×1: 1·3 + 2·4 = 11.

21. If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then the (1,1) entry of AB is:

(A) 19
(B) 11
(C) 23
(D) 31

Correct Answer: A

Explanation: Row 1 of A dotted with column 1 of B: 1·5 + 2·7 = 19.

22. If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then AB equals:

(A) [[23, 34], [31, 46]]
(B) [[19, 22], [43, 50]]
(C) [[6, 8], [10, 12]]
(D) [[5, 12], [21, 32]]

Correct Answer: B

Explanation: If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then AB equals [[19, 22], [43, 50]].

23. If A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]], then BA equals:

(A) [[19, 22], [43, 50]]
(B) [[6, 8], [10, 12]]
(C) [[23, 34], [31, 46]]
(D) [[11, 16], [13, 18]]

Correct Answer: C

Explanation: Order matters: BA = [[23,34],[31,46]], which differs from AB.

24. For A = [[2, 0], [0, 3]] and B = [[1, 4], [5, 6]], the product AB equals:

(A) [[2, 12], [0, 18]]
(B) [[1, 4], [15, 18]]
(C) [[2, 8], [5, 18]]
(D) [[2, 8], [15, 18]]

Correct Answer: D

Explanation: Left diagonal scaling: rows of B are scaled by 2 and 3 respectively.

25. Matrix multiplication is generally:

(A) non-commutative: AB need not equal BA
(B) commutative: AB = BA always
(C) defined only for 1 × 1 matrices
(D) the same as entry-wise multiplication

Correct Answer: A

Explanation: Even when both products exist, AB and BA can differ.

26. Matrix multiplication is associative, meaning:

(A) AB = BA
(B) A(BC) = (AB)C
(C) A + B = B + A
(D) k(AB) = kA · kB always as matrices

Correct Answer: B

Explanation: Parentheses can be regrouped: A(BC) = (AB)C when the chain is compatible.

27. The distributive law for matrices states that:

(A) AB = BA
(B) (AB)C = A(BC) only for diagonal A

(C) A(B + C) = AB + AC
(D) A + B = AB

Correct Answer: C

Explanation: A multiplies each term inside the sum on the right when orders match.

28. If A is 2 × 3 and B is 3 × 4, then AB has order:

(A) 3 × 3
(B) 4 × 2
(C) 2 × 3
(D) 2 × 4

Correct Answer: D

Explanation: (2×3)(3×4) → 2 rows and 4 columns, so the correct choice is 2 × 4.

29. If A is 2 × 2 and B is 2 × 2, then BA has order:

(A) 2 × 2
(B) 2 × 4
(C) 4 × 2
(D) undefined

Correct Answer: A

Explanation: (2×2)(2×2) remains 2 × 2, so the correct choice is 2 × 2.

30. For A = [[0, 1], [1, 0]] and B = [[1, 2], [3, 4]], compute AB:

(A) [[1, 2], [3, 4]]
(B) [[3, 4], [1, 2]]
(C) [[2, 1], [4, 3]]
(D) [[1, 3], [2, 4]]

Correct Answer: B

Explanation: Swapping rows of B gives [[3,4],[1,2]], so the correct choice is [[3, 4], [1, 2]].

31. For A = [[1, 0], [0, 2]] and B = [[3, 1], [2, 4]], compute AB:

(A) [[3, 2], [4, 8]]
(B) [[3, 1], [2, 8]]
(C) [[3, 1], [4, 8]]
(D) [[5, 5], [4, 8]]

Correct Answer: C

Explanation: For A = [[1, 0], [0, 2]] and B = [[3, 1], [2, 4]], compute AB [[3, 1], [4, 8]].

32. The determinant of a 2 × 2 matrix [[a, b], [c, d]] is:

(A) a + d − b − c
(B) ac − bd
(C) a/d − b/c
(D) ad − bc

Correct Answer: D

Explanation: The determinant of a 2 × 2 matrix [[a, b], [c, d]] is ad − bc.

33. If A = [[3, 1], [2, 4]], then |A| equals:

(A) 10
(B) 14
(C) 12
(D) 2

Correct Answer: A

Explanation: 3·4 − 1·2 = 12 − 2 = 10, so the correct choice is 10.

34. If A = [[5, −2], [3, 1]], then |A| equals:

(A) 7
(B) 11

(C) −1
(D) 13

Correct Answer: B

Explanation: 5·1 − (−2)·3 = 5 + 6 = 11, so the correct choice is 11.

35. If A = [[2, 4], [1, 2]], then |A| equals:

(A) 4
(B) 8
(C) 0
(D) −4

Correct Answer: C

Explanation: 2·2 − 4·1 = 4 − 4 = 0, so A is singular.

36. If A = [[−1, 3], [2, 5]], then |A| equals:

(A) 11
(B) 7
(C) −7
(D) −11

Correct Answer: D

Explanation: (−1)·5 − 3·2 = −5 − 6 = −11, so the correct choice is −11.

37. If A = [[1, 2], [3, 4]], then |A| equals:

(A) −2
(B) 2
(C) 10
(D) −10

Correct Answer: A

Explanation: 1·4 − 2·3 = 4 − 6 = −2, so the correct choice is −2.

38. If A = [[6, 0], [0, 6]], then |A| equals:

(A) 12
(B) 36
(C) 0
(D) 6

Correct Answer: B

Explanation: If A = [[6, 0], [0, 6]], then |A| equals 36.

39. A square matrix A is singular when:

(A) |A| ≠ 0
(B) A = I
(C) |A| = 0
(D) A is diagonal

Correct Answer: C

Explanation: Singular means the determinant is zero, so A has no inverse.

40. A square matrix A is non-singular when:

(A) |A| = 0
(B) all entries are zero
(C) A is not square
(D) |A| ≠ 0

Correct Answer: D

Explanation: A square matrix A is non-singular when |A| ≠ 0.

41. The adjoint (adjugate) of [[a, b], [c, d]] is:

(A) [[d, −b], [−c, a]]
(B) [[a, c], [b, d]]

(C) [[d, b], [c, a]]
(D) [[a, d], [c, b]]

Correct Answer: A

Explanation: The adjoint (adjugate) of [[a, b], [c, d]] is [[d, −b], [−c, a]].

42. If A = [[2, 3], [1, 4]], then adj(A) equals:

(A) [[4, 3], [1, 2]]
(B) [[4, −3], [−1, 2]]
(C) [[2, 1], [3, 4]]
(D) [[4, −1], [−3, 2]]

Correct Answer: B

Explanation: If A = [[2, 3], [1, 4]], then adj(A) equals [[4, −3], [−1, 2]].

43. If A = [[2, 3], [1, 4]] with |A| = 5, then A□¹ equals:

(A) [[4, −3], [−1, 2]]
(B) [[2/5, 3/5], [1/5, 4/5]]
(C) [[4/5, −3/5], [−1/5, 2/5]]
(D) [[4/5, −1/5], [−3/5, 2/5]]

Correct Answer: C

Explanation: If A = [[2, 3], [1, 4]] with |A| = 5, then A□¹ equals [[4/5, −3/5], [−1/5, 2/5]].

44. If A = [[1, 2], [3, 4]], then A□¹ equals:

(A) [[4, −2], [−3, 1]]
(B) [[2, −1], [−1.5, 0.5]]
(C) does not exist because |A| = 0
(D) [[−2, 1], [1.5, −0.5]]

Correct Answer: D

Explanation: If A = [[1, 2], [3, 4]], then A□¹ equals [[−2, 1], [1.5, −0.5]].

45. If A is invertible, then A · A□¹ equals:

(A) I
(B) O
(C) A
(D) A²

Correct Answer: A

Explanation: If A is invertible, then A · A□¹ equals I.

46. If |A| = 0, then A□¹:

(A) equals O
(B) does not exist
(C) equals I
(D) equals adj(A) without scaling

Correct Answer: B

Explanation: Zero determinant means the matrix is singular and has no inverse.

47. For the system 2x + 3y = 7, x + 4y = 6, the coefficient matrix is:

(A) [[2, 7], [1, 6]]
(B) [[7, 3], [6, 4]]
(C) [[2, 3], [1, 4]]
(D) [[2, 3], [4, 1]]

Correct Answer: C

Explanation: For the system 2x + 3y = 7, x + 4y = 6, the coefficient matrix is [[2, 3], [1, 4]].

48. For 2x + 3y = 7, x + 4y = 6, Cramer's rule gives x equal to:

(A) 1
(B) 3

(C) 5
(D) 2

Correct Answer: D

Explanation: For 2x + 3y = 7, x + 4y = 6, Cramer's rule gives x equal to 2.

49. For 2x + 3y = 7, x + 4y = 6, Cramer's rule gives y equal to:

(A) 1
(B) 0
(C) 2
(D) 3

Correct Answer: A

Explanation: For 2x + 3y = 7, x + 4y = 6, Cramer's rule gives y equal to 1.

50. Using A□¹ for [[2,3],[1,4]] to solve 2x+3y=7, x+4y=6, the solution vector is:

(A) [[1], [2]]
(B) [[2], [1]]
(C) [[3], [0]]
(D) [[2], [2]]

Correct Answer: B

Explanation: X = A□¹B with B = [[7],[6]] yields x = 2 and y = 1.

51. For 5x + 2y = 9, 3x + 4y = 11, |A| = det[[5,2],[3,4]] equals:

(A) 20
(B) 11
(C) 14
(D) 8

Correct Answer: C

Explanation: 5·4 − 2·3 = 20 − 6 = 14, so the correct choice is 14.

52. For 5x + 2y = 9, 3x + 4y = 11, Cramer's rule gives x equal to:

(A) 2
(B) 3
(C) 4
(D) 1

Correct Answer: D

Explanation: For 5x + 2y = 9, 3x + 4y = 11, Cramer's rule gives x equal to 1.

53. For 5x + 2y = 9, 3x + 4y = 11, Cramer's rule gives y equal to:

(A) 2
(B) 1
(C) 3
(D) 4

Correct Answer: A

Explanation: For 5x + 2y = 9, 3x + 4y = 11, Cramer's rule gives y equal to 2.

54. For x + 2y = 5, 3x + 4y = 11, Cramer's rule gives x equal to:

(A) 2
(B) 1
(C) 3
(D) 4

Correct Answer: B

Explanation: For x + 2y = 5, 3x + 4y = 11, Cramer's rule gives x equal to 1.

55. For x + 2y = 5, 3x + 4y = 11, Cramer's rule gives y equal to:

(A) 1
(B) 3

(C) 2
(D) 4

Correct Answer: C

Explanation: For x + 2y = 5, 3x + 4y = 11, Cramer's rule gives y equal to 2.

56. If A = [[2, 3], [1, 4]] and B = [[1, 2], [3, 4]], then |A|·|B| equals:

(A) 10
(B) −5
(C) 5
(D) −10

Correct Answer: D

Explanation: |A| = 5 and |B| = −2, so the product is −10.

57. If A = [[2, 3], [1, 4]] and B = [[1, 2], [3, 4]], then |AB| equals:

(A) −10
(B) 10
(C) −5
(D) 5

Correct Answer: A

Explanation: If A = [[2, 3], [1, 4]] and B = [[1, 2], [3, 4]], then |AB| equals −10.

58. For invertible 2 × 2 matrices A and B, the property |AB| = |A|·|B| is called:

(A) the commutative law
(B) the multiplicative property of determinants
(C) the zero-product rule
(D) the distributive law

Correct Answer: B

Explanation: Determinants multiply when the matrices multiply: |AB| = |A||B|.

59. If A = [[3, 1], [2, 5]] and B = [[1, 0], [2, 3]], then |AB| equals:

(A) 13
(B) 26
(C) 39
(D) 9

Correct Answer: C

Explanation: |A| = 13, |B| = 3, so |AB| = 39 without expanding fully.

60. If A = [[4, 0], [0, 5]], then |A| equals:

(A) 9
(B) 0
(C) 1
(D) 20

Correct Answer: D

Explanation: Determinant of a diagonal matrix is the product 4·5 = 20.

61. If A = [[1, 3], [2, 6]], then |A| equals:

(A) 0
(B) 6
(C) 12
(D) −6

Correct Answer: A

Explanation: 1·6 − 3·2 = 6 − 6 = 0; rows are proportional, so A is singular.

62. If A = [[7, −1], [2, 3]], then |A| equals:

(A) 19
(B) 23

(C) 21
(D) 17

Correct Answer: B

Explanation: 7·3 − (−1)·2 = 21 + 2 = 23, so the correct choice is 23.

63. If A = [[2, 1], [0, 3]], B = [[1, 2], [3, 1]], then AB equals:

(A) [[2, 4], [9, 3]]
(B) [[5, 3], [9, 3]]
(C) [[5, 5], [9, 3]]
(D) [[2, 1], [3, 3]]

Correct Answer: C

Explanation: If A = [[2, 1], [0, 3]], B = [[1, 2], [3, 1]], then AB equals [[5, 5], [9, 3]].

64. If A = [[1, 0], [2, 1]], B = [[3, 4], [0, 5]], then AB equals:

(A) [[3, 20], [6, 5]]
(B) [[3, 4], [2, 5]]
(C) [[3, 9], [6, 13]]
(D) [[3, 4], [6, 13]]

Correct Answer: D

Explanation: [[3,4],[6,8+5]] = [[3,4],[6,13]], so the correct choice is [[3, 4], [6, 13]].

65. If A = [[−1, 2], [3, −4]], then |A| equals:

(A) −2
(B) 2
(C) 10
(D) −10

Correct Answer: A

Explanation: (−1)(−4) − 2·3 = 4 − 6 = −2, so the correct choice is −2.

66. If A = [[−1, 2], [3, −4]] with |A| = −2, then A□¹ equals:

(A) [[−2, −1], [−1.5, −0.5]]
(B) [[2, 1], [1.5, 0.5]]
(C) [[−4, −2], [−3, −1]]
(D) [[4, 2], [3, 1]]

Correct Answer: B

Explanation: If A = [[−1, 2], [3, −4]] with |A| = −2, then A□¹ equals [[2, 1], [1.5, 0.5]].

67. For 2x + y = 5, x − y = 1, Cramer's rule gives x equal to:

(A) 1
(B) 3
(C) 2
(D) 4

Correct Answer: C

Explanation: For 2x + y = 5, x − y = 1, Cramer's rule gives x equal to 2.

68. If |A| = 4 for an invertible 2 × 2 matrix A, then |A□¹| equals:

(A) 4
(B) −4
(C) 2
(D) 1/4

Correct Answer: D

Explanation: If |A| = 4 for an invertible 2 × 2 matrix A, then |A□¹| equals 1/4.

69. If k = 2 and A is 2 × 2 with |A| = 5, then |2A| equals:

(A) 20
(B) 10

(C) 4
(D) 25

Correct Answer: A

Explanation: For order 2, $|kA| = k^2|A| = 4 \cdot 5 = 20$, so the correct choice is 20.

70. If A = [[0, 1], [1, 0]], then |A| equals:

(A) 1
(B) −1
(C) 0
(D) 2

Correct Answer: B

Explanation: $0 \cdot 0 - 1 \cdot 1 = -1$, so the correct choice is −1.

71. Matrix addition is commutative, so for compatible A and B:

(A) AB = BA
(B) A − B = B − A
(C) A + B = B + A
(D) A + B = AB

Correct Answer: C

Explanation: Entry-wise addition can be done in either order.

72. If A and B are both 2 × 3, then A − B is defined and has order:

(A) 3 × 2
(B) 2 × 2
(C) 3 × 3
(D) 2 × 3

Correct Answer: D

Explanation: Subtraction requires the same order, which is preserved.

73. If A is 2 × 3 and B is 3 × 2, then A + B is:

(A) not defined
(B) 2 × 2
(C) 3 × 3
(D) defined with order 2 × 3

Correct Answer: A

Explanation: If A is 2 × 3 and B is 3 × 2, then A + B is not defined.

74. If A = [[1, 2], [3, 4]] and C = [[1, 2], [3, 4]], then A − C equals:

(A) I
(B) O
(C) 2A
(D) A^2

Correct Answer: B

Explanation: If A = [[1, 2], [3, 4]] and C = [[1, 2], [3, 4]], then A − C equals O.

75. If A = [[2, 0], [0, 2]], then A represents:

(A) the identity matrix
(B) a zero matrix
(C) the scalar matrix 2I
(D) a singular matrix only

Correct Answer: C

Explanation: Equal diagonal entries 2 with zeros off-diagonal give 2I.

76. If A = [[3, 0], [0, −1]], then |A| equals:

(A) 2
(B) 3

(C) −2
(D) −3

Correct Answer: D

Explanation: If A = [[3, 0], [0, −1]], then |A| equals −3.

77. If A = [[3, 0], [0, −1]], then A□¹ equals:

(A) [[1/3, 0], [0, −1]]
(B) [[1/3, 0], [0, 1]]
(C) [[3, 0], [0, −1]]
(D) [[1/3, 0], [0, −1/3]]

Correct Answer: A

Explanation: If A = [[3, 0], [0, −1]], then A□¹ equals [[1/3, 0], [0, −1]].

78. If A = [[1, 2], [3, 4]] and B = [[2, 0], [0, 2]], then AB equals:

(A) [[1, 2], [3, 4]]
(B) [[2, 4], [6, 8]]
(C) [[3, 2], [7, 4]]
(D) [[2, 0], [0, 8]]

Correct Answer: B

Explanation: If A = [[1, 2], [3, 4]] and B = [[2, 0], [0, 2]], then AB equals [[2, 4], [6, 8]].

79. If A = [[4, 2], [3, 1]] and B = [[1, 2], [3, 4]], then |AB| equals:

(A) −4
(B) −2
(C) 4
(D) 2

Correct Answer: C

Explanation: |A| = −2 and |B| = −2, so |AB| = 4; direct check on AB = [[10,16],[6,10]] gives 100 − 96 = 4.

80. If A = [[4, 2], [3, 1]], then |A| equals:

(A) 2
(B) 10
(C) −10
(D) −2

Correct Answer: D

Explanation: 4·1 − 2·3 = 4 − 6 = −2, so the correct choice is −2.

B. Less Important / Secondary Topics

81. A row matrix has:

(A) only one row
(B) only one column
(C) equal rows and columns
(D) zero entries only

Correct Answer: A

Explanation: A row matrix has only one row.

82. A column matrix has:

(A) only one row
(B) only one column
(C) order 2 × 2 always
(D) no order

Correct Answer: B

Explanation: A column matrix has only one column.

83. The element a□□ sits in:

(A) row 2, column 1
(B) row 1, column 1
(C) row 1, column 2
(D) row 2, column 2

Correct Answer: C

Explanation: The element a□□ sits in row 1, column 2.

84. A 5 × 1 matrix is an example of a:

(A) row matrix
(B) square matrix
(C) scalar matrix
(D) column matrix

Correct Answer: D

Explanation: One column and five rows define a column matrix.

85. The zero matrix used as an additive identity has the same order as:

(A) the matrix being added to it
(B) only square matrices
(C) always 1 × 1
(D) the identity matrix only

Correct Answer: A

Explanation: O must match the order of A in A + O, so the correct choice is the matrix being added to it.

86. In [[5, 0, 0], [0, −2, 0], [0, 0, 7]], non-zero entries appear only on:

(A) every position
(B) the main diagonal
(C) the first column only
(D) anti-diagonal only

Correct Answer: B

Explanation: That layout is diagonal: all off-diagonal entries are zero.

87. The scalar matrix with k = −3 in order 2 is:

(A) [[0, −3], [−3, 0]]
(B) [[−3, −3], [−3, −3]]
(C) [[−3, 0], [0, −3]]
(D) [[0, 0], [0, 0]]

Correct Answer: C

Explanation: The scalar matrix with k = −3 in order 2 is [[−3, 0], [0, −3]].

88. Adding matrices of different orders such as 2 × 2 and 2 × 3 is:

(A) always zero
(B) commutative only
(C) the same as multiplication
(D) not defined

Correct Answer: D

Explanation: Adding matrices of different orders such as 2 × 2 and 2 × 3 is not defined.

89. If A = [[1, 0], [2, 3]] and k = 0, then kA equals:

(A) O
(B) A
(C) I
(D) undefined

Correct Answer: A

Explanation: If A = [[1, 0], [2, 3]] and k = 0, then kA equals O.

90. If A = [[2, 1]] and B = [[3], [4]], then AB equals the 1 × 1 matrix:

(A) [[10]]
(B) [[11]]
(C) [[7]]
(D) [[5]]

Correct Answer: B

Explanation: Row·column product: 2·3 + 1·4 = 11, so the correct choice is [[11]].

91. If A = [[1, 0], [0, 0]] and B = [[0, 1], [0, 0]], then AB equals:

(A) [[0, 0], [0, 0]]
(B) [[1, 1], [0, 0]]
(C) [[0, 1], [0, 0]]
(D) [[0, 0], [1, 0]]

Correct Answer: C

Explanation: Only the first row of A is non-zero, reproducing row 1 of B.

92. For compatible matrices, (AB)C and A(BC) are:

(A) always different
(B) defined only for diagonal A
(C) equal to A + B + C
(D) equal when both sides are defined

Correct Answer: D

Explanation: For compatible matrices, (AB)C and A(BC) are equal when both sides are defined.

93. If A = [[1, 2], [3, 4]], then A · O equals:

(A) O
(B) A
(C) I
(D) undefined

Correct Answer: A

Explanation: If A = [[1, 2], [3, 4]], then A · O equals O.

94. The determinant |I□| equals:

(A) 0
(B) 1
(C) 2
(D) −1

Correct Answer: B

Explanation: Identity has determinant 1, so the correct choice is 1.

95. If rows of a 2 × 2 matrix are proportional, then |A| is:

(A) always 1
(B) always negative
(C) zero
(D) undefined

Correct Answer: C

Explanation: If rows of a 2 × 2 matrix are proportional, then |A| is zero.

96. If A = [[8, 0], [0, 3]], then A□¹ equals:

(A) [[8, 0], [0, 3]]
(B) [[0, 1/8], [1/3, 0]]
(C) does not exist
(D) [[1/8, 0], [0, 1/3]]

Correct Answer: D

Explanation: Invert each diagonal entry when the matrix is diagonal and non-singular.

97. Cramer's rule applies directly to a 2 × 2 linear system when:

(A) $|A| \neq 0$
(B) $|A| = 0$
(C) all coefficients are zero
(D) there is only one variable

Correct Answer: A

Explanation: Cramer's rule applies directly to a 2 × 2 linear system when $|A| \neq 0$.

98. For 3x + y = 7, x − y = 1, Cramer's rule gives x equal to:

(A) 1
(B) 2
(C) 3
(D) 4

Correct Answer: B

Explanation: $|A| = -4$; $|A_x| = -8$; $x = 2$, so the correct choice is 2.

99. For 3x + y = 7, x − y = 1, Cramer's rule gives y equal to:

(A) 0
(B) 2
(C) 1
(D) 3

Correct Answer: C

Explanation: $|A_y| = -4$; $y = 1$, so the correct choice is 1.

100. If $|A| = -3$ and $|B| = 4$, then $|AB|$ equals:

(A) 12
(B) −7
(C) 7
(D) −12

Correct Answer: D

Explanation: Determinants multiply: $(-3)(4) = -12$, so the correct choice is −12.

101. If A = [[1, 1], [1, 1]], then |A| equals:

(A) 0
(B) 2
(C) 1
(D) −1

Correct Answer: A

Explanation: If A = [[1, 1], [1, 1]], then |A| equals 0.

102. If A = [[2, 0], [1, 3]] and B = [[1, 4], [0, 2]], then the (2,1) entry of AB is:

(A) 2
(B) 1
(C) 3
(D) 4

Correct Answer: B

Explanation: If A = [[2, 0], [1, 3]] and B = [[1, 4], [0, 2]], then the (2,1) entry of AB is 1.

103. If A = [[0, 2], [0, 1]] and B = [[3, 1], [0, 4]], then AB equals:

(A) [[3, 1], [0, 4]]
(B) [[0, 2], [0, 1]]
(C) [[0, 8], [0, 4]]
(D) [[6, 2], [0, 4]]

Correct Answer: C

Explanation: First column of A is zero, so only the second column of B contributes.

104. If A = [[1, −1], [2, 3]] and B = [[4, 0], [1, 5]], then A + B equals:

(A) [[5, 1], [3, 8]]
(B) [[4, −1], [2, 8]]
(C) [[5, −1], [2, 3]]
(D) [[5, −1], [3, 8]]

Correct Answer: D

Explanation: If A = [[1, −1], [2, 3]] and B = [[4, 0], [1, 5]], then A + B equals [[5, −1], [3, 8]].

105. If k = −2 and A = [[1, −3], [0, 4]], then kA equals:

(A) [[−2, 6], [0, −8]]
(B) [[−2, −6], [0, −8]]
(C) [[2, 6], [0, 8]]
(D) [[−1, −3], [0, 4]]

Correct Answer: A

Explanation: Multiply each entry by −2, so the correct choice is [[−2, 6], [0, −8]].

106. If A is invertible, A□¹A equals:

(A) O
(B) I
(C) A
(D) |A|

Correct Answer: B

Explanation: The inverse on the left also yields the identity.

107. A 1 × 1 matrix [[7]] has determinant:

(A) 0
(B) 1
(C) 7
(D) 49

Correct Answer: C

Explanation: The single entry is the determinant, so the correct choice is 7.

108. If A = [[2, 1], [4, 3]] and B = [[1, 0], [2, 1]], then det(B) equals:

(A) 0
(B) −1
(C) 2
(D) 1

Correct Answer: D

Explanation: 1·1 − 0·2 = 1, so the correct choice is 1.