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MATHEMATICS WORKSHEET

Eigenvectors

Chapter: Linear Algebra · Level ★★★ · Time: 30 min

SCORE ___ / 20

Name ________________ Class ________________ Date ________________

AFTER THIS WORKSHEET YOU CAN

✓ Find an eigenvector by solving $(A - \lambda I)v = 0$.
✓ Recognise scalar multiples of eigenvectors.
✓ Understand why $(A - \lambda I)$ must be singular.
✓ Connect eigenvectors to diagonalizability.

Section A · Concept Check

BEGINNER 4 × 1 = 4

1 For [[5,2],[2,5]], $\lambda = 3$, A−3I = [[2,2],[2,2]]. An eigenvector is:

◯ A. (1,−1) ◯ B. (1,1) ◯ C. (2,2) ◯ D. (0,0)

2 For [[5,2],[2,5]], $\lambda = 7$, A−7I = [[−2,2],[2,−2]]. An eigenvector is:

◯ A. (1,1) ◯ B. (1,−1) ◯ C. (−2,2) ◯ D. (0,0)

3 For [[2,1],[0,2]], $\lambda = 2$, A−2I = [[0,1],[0,0]]. An eigenvector is:

◯ A. (1,0) ◯ B. (0,1) ◯ C. (1,1) ◯ D. (1,−1)

4 If (1,−1) is an eigenvector, is (5,−5) also one?

◯ A. Yes ◯ B. No ◯ C. Only sometimes

◯ D. Cannot tell

Section B · Problem Solving

INTERMEDIATE 2 + 3×3 = 11

5 An eigenvector satisfies Av = ________________

6 To find eigenvectors for λ, solve (A − ________________)v = 0.

7 For [[5,2],[2,5]] with eigenvalue 3, form (A−3I) and solve for the eigenvector.

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8 For [[5,2],[2,5]] with eigenvalue 7, form (A−7I) and solve for the eigenvector.

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9 For [[2,1],[0,2]] with eigenvalue 2, form (A−2I) and solve for the eigenvector.

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Section C · Challenge

CHALLENGE 5

10 Is (5,−5) a valid eigenvector if (1,−1) is one for the same eigenvalue?

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Reflection — the most useful thing I learned: ____

A ___/4 B ___/11 C ___/5 **Total ___/20**

Teacher's Signature

Parent's Signature

✂ ANSWER KEY — FOLD OR CUT BEFORE HANDING OUT

1-A 2-A 3-A 4-A | 5 λv 6 λI 7 = x+y=0, eigenvector (1,-1) 8 = -x+y=0, eigenvector (1,1)
9 = y=0, eigenvector (1,0) | 10 = Yes, it's a scalar multiple (5 times)