



BitWith Bite

AI & MACHINE LEARNING WORKSHEET

Eigenvalues & Eigenvectors

Chapter: AI & Machine Learning · Level ★★★ ·
Time: 30 min

SCORE

___ / 20

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

✓ Intuit $Av = \lambda v$ ✓ Directions that only scale ✓ Why PCA uses them ✓ Find simple eigenvalues

Section A · Concept Check • BEGINNER $4 \times 1 = 4$ _____

- 1 An eigenvector under A only gets:
☐ A. scaled ☐ B. rotated ☐ C. deleted
☐ D. normalised
- 2 The scale factor is the:
☐ A. eigenvalue ☐ B. determinant ☐ C. norm
☐ D. rank
- 3 Eigen-analysis powers which ML technique?
☐ A. PCA ☐ B. SQL ☐ C. CSS ☐ D. DNS
- 4 Eigenvalues of a diagonal matrix are:
☐ A. its diagonal entries ☐ B. zeros ☐ C. all 1
☐ D. undefined

Section B · Problem Solving • INTERMEDIATE $2 + 3 \times 3 = 11$ _____

- 5 The defining equation: $Av = \dots v$.
- 6 Eigenvectors keep their _____ under the transform.
- 7 Eigenvalues of $\begin{bmatrix} 3 & 0 \\ 0 & 7 \end{bmatrix}$?

- 8 Why does PCA pick top eigenvectors?

- 9 Geometric meaning of $\lambda = 1$?

Section C · Challenge • CHALLENGE 5 _____

- 10 What does a negative eigenvalue do?

🧠 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 λ 6 direction 7 = 3 and 7 (diagonal) 8 = They are the directions of maximum variance in the data 9 = That direction is unchanged in length | 10 = Flips the direction while scaling

