Unit 13 - Week 12

Week 12 Assessment
The due date for submitting this assignment has passed.

Submitted assignment

1) Using Power method, the dominant eigenvalue and the corresponding eigen vector of the matrix

\[ A = \begin{pmatrix} 1 & 3 & -1 \\ 4 & -4 & 5 \\ 1 & 4 & -2 \end{pmatrix} \]

are given by

- 5, [0.6, 1, 0.6]^
- 3.4, [0.8824, 0.4118, 1.0000]^
- -8.3663, [-0.3810, 1.0000, -0.5685]^
- -2.1257, [-0.2137, 1.0000, -0.4178]^

No, the answer is incorrect.
Score: 0

Accepted Answers:
- -8.3663, [-0.3810, 1.0000, -0.5685]^

2) Using the inverse Power method, the least dominant eigenvalue and the corresponding eigen vector of the matrix

\[ A = \begin{pmatrix} 1 & 3 & -1 \\ 4 & -4 & 5 \\ 1 & 4 & -2 \end{pmatrix} \]

are given by

- 0.6765, [-0.8710, 0.5484, 1.0000]^
- -0.2325, [-0.6749, 0.6106, 1.0000]^
- -0.3654, [-0.5735, 0.6783, 1.0000]^
- 0.1322, [-0.3421, 0.4312, 1.0000]^

No, the answer is incorrect.
Score: 0

Accepted Answers:
- -0.2325, [-0.6749, 0.6106, 1.0000]^

3) 

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No, the answer is incorrect. Score: 0
Accepted Answers: 0.4506

4) Let \( A = \begin{pmatrix} -2 & 2 & 5 \\ 2 & 1 & 2 \\ 2 & 2 & 3 \end{pmatrix} \) The eigen values of \( A \) are given by \( \lambda_1 = 6.0325 \), \( \lambda_2 = -3.6713 \) and \( \lambda_3 = -0.3612 \). The rate of convergence of the power method is given by

- 0.6086
- 0.0599
- 0.0984
- 1.6432

No, the answer is incorrect. Score: 0
Accepted Answers: 0.6086

5) Taking \( \rho = 85 \) and applying the Power method with shift, the least dominant eigen pair of

\[ A = \begin{pmatrix} 99 & 10 & -10 \\ 23 & 88 & 3 \\ 35 & 11 & 80 \end{pmatrix} \]

is given by

- 1.9996, \([-0.1504, 1.0000, 0.8196]^T\]
- 0.2496, \([-0.1858, 0.8196, 1.0000]^T\]
- 0.1667, \([-0.2105, 0.6842, 1.0000]^T\]
- 0.1429, \([-1.0000, 0.7611, 0.8196]^T\]

No, the answer is incorrect. Score: 0
Accepted Answers: 1.9996, \([-0.1504, 1.0000, 0.8196]^T\]

6) Let \( A = \begin{pmatrix} 99 & 10 & -10 \\ 23 & 88 & 3 \\ 35 & 11 & 80 \end{pmatrix} \) The eigen values of \( A \) are given by \( \lambda_1 = 91 \), \( \lambda_2 = 89 \) and \( \lambda_3 = 87 \). Then the rate of convergence of the power method with shift \( \rho = 86 \) to compute the least dominant eigen pair for the shifted matrix \( B = A - \rho I \) is given by

- 0.6
- 0.3333
- 0.5
- 0.2
No, the answer is incorrect.
Score: 0
Accepted Answers:
0.3333

7)
Let \( A = \begin{pmatrix} 5 & 1 & -2 \\ 1 & 2 & 1 \\ -2 & 1 & 3 \end{pmatrix} \). In Jacobi’s method, the off-diagonal entry to be zero is

- \( a_{13} = a_{31} = -2 \)
- \( a_{12} = a_{21} = 1 \)
- \( a_{23} = a_{32} = 1 \)
- none of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( a_{13} = a_{31} = -2 \)

8)
Using Jacobi’s method, the eigen values and eigen vectors of the matrix \( A = \begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix} \) are given by

- \( 0, 3, 3; \left[ 0.5774, 0.5774, -0.5774 \right]^T, \left[ -0.7071, 0.7071, 0 \right]^T, \left[ 0.4082, 0.4082, 0.8165 \right]^T \)
- \( -3, 3, 3; \left[ \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0 \right]^T, \left[ -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0 \right]^T, \left[ 0, 0, 1 \right]^T \)
- \( 6, -2, 4; \left[ \frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T, \left[ 0, 1, 0 \right]^T, \left[ -\frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T \)
- \( 6, 2, 4; \left[ -\frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T, \left[ 0, 1, 0 \right]^T, \left[ \frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( 6, -2, 4; \left[ \frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T, \left[ 0, 1, 0 \right]^T, \left[ -\frac{1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} \right]^T \)

9)
Using Jacobi’s method, to find all the eigen values and eigen vectors of the matrix \( A = \begin{pmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix} \), the first rotation matrix in order to make the pair \( a_{13} = a_{31} \) equal to zero, is given by

- \( \begin{pmatrix} \frac{1}{\sqrt{2}} & 0 & -\frac{1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \end{pmatrix} \)
- \( \begin{pmatrix} -\frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & -\frac{1}{\sqrt{2}} \end{pmatrix} \)
No, the answer is incorrect.
Score: 0

Accepted Answers:
\[
\begin{pmatrix}
\frac{1}{\sqrt{2}} & 0 & -\frac{1}{\sqrt{2}} \\
0 & 1 & 0 \\
-\frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}}
\end{pmatrix}
\]

10) Using Jacobi’s method, to find all the eigenvalues and eigen vectors of the matrix
\[
A = \begin{pmatrix}
2 & -1 & -1 \\
-1 & 2 & -1 \\
-1 & -1 & 2
\end{pmatrix}
\]
the first rotation matrix in order to make the pair \(a_{12} = a_{21}\) equal to zero, is given by

No, the answer is incorrect.
Score: 0

Accepted Answers:
\[
\begin{pmatrix}
\frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 \\
\frac{1}{\sqrt{2}} & 0 & 0 \\
-\frac{1}{\sqrt{2}} & 0 & 0
\end{pmatrix}
\]