Started on	Thursday, 8 June 2023, 11:57 AM
State	Finished
Completed on	Thursday, 8 June 2023, 12:25 PM
Time taken	28 mins 17 secs
Marks	6.00/8.00
Grade	**5.25** out of 7.00 (**75**%)

Question **1**

Partially correct

Mark 0.50 out of 1.00

If $A = \begin{pmatrix} p & 0.3 \\ 1-p & 0.7 \end{pmatrix}$ is transition matrix, then the steady state vecto

p is the last digit of your roll number $\times$ 0. 1.

- [x] a. Eigenvector corresponding to Second largest eigenvalue. ✖
- [ ] b. Only the negative elements of first column of A^k, where $k \to \infty$
- [ ] c. Only the negative elements of the first row of A^k, where $k \to \infty$
- [x] d. Eigenvector corresponding to largest eigenvalue. ✔

Your answer is partially correct.

You have selected too many options.

The correct answer is:

Eigenvector corresponding to largest eigenvalue.

Question **2**

Correct

Mark 2.00 out of 2.00

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

Then the following statement(s) are true:

- [ ] a. If λ is the eigenvalue of A then $|\lambda| = 1$ and for B, $\lambda = e^{\pm i\theta}$
- [x] b. None of these.
- [ ] c. $\| Ax\| = \|x\|$, and $\| Bx\| < \|x\|$
- [ ] d. θ is the last digit of your roll number. Det(A)=1; and det(B) =θ
- [ ] e. If θ is the any digit of your roll number, then $|\lambda| = \infty$

Your answer is correct.

The correct answer is:
None of these.

Question **3**

Correct

Mark 2.00 out of 2.00

$$A = \begin{bmatrix} 1 & 2 & 2 \\ -1 & 1 & 2 \\ -1 & 0 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

Let A=QR, where Q is orthogonal, and R is upper triangular.

Which statement(s) is /are correct?

- [ ] a. None of these.
- [ ] b. The matrix is not invertible. Thus QR decomposition cannot be performed.
- [ ] c. The matrix is not invertible. One of the eigenvalue is zero. Thus QR decomposition cannot be performed here.
- [x] d.

$$Q = [\mathbf{q}_1 \quad \mathbf{q}_2 \quad \mathbf{q}_3] = \begin{bmatrix} 1/2 & 3\sqrt{5}/10 & -\sqrt{6}/6 \\ -1/2 & 3\sqrt{5}/10 & 0 \\ -1/2 & \sqrt{5}/10 & \sqrt{6}/6 \\ 1/2 & \sqrt{5}/10 & \sqrt{6}/3 \end{bmatrix}$$

$$R= \begin{bmatrix} 2 & 1 & 1/2 \\ 0 & \sqrt{5} & 3\sqrt{5}/2 \\ 0 & 0 & \sqrt{6}/2 \end{bmatrix}$$

Your answer is correct.

The correct answer is:

$$Q = [\mathbf{q}_1 \quad \mathbf{q}_2 \quad \mathbf{q}_3] = \begin{bmatrix} 1/2 & 3\sqrt{5}/10 & -\sqrt{6}/6 \\ -1/2 & 3\sqrt{5}/10 & 0 \\ -1/2 & \sqrt{5}/10 & \sqrt{6}/6 \\ 1/2 & \sqrt{5}/10 & \sqrt{6}/3 \end{bmatrix}$$

$$R= \begin{bmatrix} 2 & 1 & 1/2 \\ 0 & \sqrt{5} & 3\sqrt{5}/2 \\ 0 & 0 & \sqrt{6}/2 \end{bmatrix}$$

Question **4**

Incorrect

Mark 0.00 out of 1.00

If $A = \begin{pmatrix} 1-p & p \\ p & 1-p \end{pmatrix}$ is transition matrix, then the steady state vec

p is (your roll number%3+1) $\times$ 0. 1.

- [ ] a. One of the elements of the steady state vector is closely 0.5.
- [x] b. One of the elements of the steady state vector is closely 1-p. ✖
- [x] c. One of the elements of the steady state vector is closely p. ✖
- [ ] d. None of these.

Your answer is incorrect.

The correct answer is:
One of the elements of the steady state vector is closely 0.5.

Question **5**

Correct

Mark 1.00 out of 1.00

If $A = \begin{pmatrix} a & b \\ c & -d \end{pmatrix}$, then the eigenvalues are

- [x] a. $\lambda_{1,2} = \frac{1}{2}\left(a - d \pm \sqrt{(a+d)^2 + 4bc}\right)$, determinant(A)=$\lambda_1\lambda_2$ ✔
- [ ] b. $\lambda_{1,2} = \frac{1}{2}\left(a + d \pm \sqrt{(a+d)^2 + 4bc}\right)$, determinant(A)+trace(A
- [ ] c. $\lambda_{1,2} = \frac{1}{2}\left(a - d \pm \sqrt{(a+d)^2 + 4bc}\right)$, determinant(A)=$\lambda_1 + \lambda_2$
- [ ] d. $\lambda_{1,2} = \frac{1}{2}\left(a + d \pm \sqrt{(a-d)^2 + 4bc}\right)$, trace(A)=$\lambda_1\lambda_2$

Your answer is correct.

The correct answer is:

$\lambda_{1,2} = \frac{1}{2}\left(a - d \pm \sqrt{(a+d)^2 + 4bc}\right)$, determinant(A)=$\lambda_1\lambda_2$

Question **6**

Partially correct

Mark 0.50 out of 1.00

Find the orthonormal basis for the column space of the matrix

Check (during calculation) which statements is/are true:

- [x] a. Gram-Schmidt (GS) procedure is required, as two of the columr
they are:

$$\mathbf{u}_1 = \frac{\mathbf{w}_1}{\|\mathbf{w}_1\|} = \frac{1}{2\sqrt{5}} \begin{pmatrix} 3 \\ 1 \\ -1 \\ 3 \end{pmatrix}, \qquad \mathbf{u}_2 = \frac{\mathbf{w}_2}{\|\mathbf{w}_2\|} = \frac{1}{2\sqrt{5}} \begin{pmatrix} 1 \\ 3 \\ 3 \\ 1 \end{pmatrix}, \qquad \mathbf{u}_3 = \frac{\mathbf{v}}{\|\mathbf{v}}$$

- [ ] b. The columns are already orthogonal to one another. As a result, anyone may readily find the orthonormal basis. The person who posed the inquiry is absolutely inept.
- [x] c. Don’t waste our time. None of these are correct.
- [ ] d. Columns are linearly independent. Thus, GS is not required.

Your answer is partially correct.

You have selected too many options.

The correct answer is:

Don’t waste our time. None of these are correct.

◄ Group A Quiz

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