

<b>Started on</b>	Tuesday, 25 April 2023, 16:11
<b>State</b>	Finished
<b>Completed on</b>	Tuesday, 25 April 2023, 16:26
<b>Time taken</b>	14 mins 2 secs
<b>Marks</b>	8.00/10.00
<b>Grade</b>	<b>0.80</b> out of 1.00 ( <b>80%</b> )

**Question 1**

Correct

Mark 1.00 out of 1.00

If any two linearly independent eigenvectors of a matrix  $A$  are orthogonal, then  $A$  is symmetric

Select one:

☐ True

☒ False ✓

The correct answer is 'False'.

**Question 2**

Correct

Mark 1.00 out of 1.00

If  $A$  is a square matrix with real entries such that  $A^2$  is symmetric, then  $A$  is symmetric

Select one:

☐ True

☒ False 

The correct answer is 'False'.

**Question 3**

Correct

Mark 1.00 out of 1.00

If all diagonal entries of a square symmetric matrix  $A$  are positive, then  $A$  is positive definite

Select one:

☐ True

☒ False 

The correct answer is 'False'.

**Question 4**

Correct

Mark 1.00 out of 1.00

A symmetric matrix with positive eigenvalues is positive definite

Select one:

☒ True ✓

☐ False

The correct answer is 'True'.

**Question 5**

Correct

Mark 1.00 out of 1.00

$x_1^2 + x_2^2 - 3x_3^2 + 4x_1x_2x_3$  is a quadratic form

Select one:

☐ True☒ False ✓

The correct answer is 'False'.

**Question 6**

Correct

Mark 1.00 out of 1.00

If  $A$  is negative definite, then all its principal minors are negative

Select one:

☐ True

☒ False ✓

The correct answer is 'False'.

**Question 7**

Correct

Mark 1.00 out of 1.00

If  $A$  is an  $n \times n$  symmetric matrix, then  $A$  has  $n$  pairwise distinct real eigenvalues

Select one:

☐ True

☒ False ✓

The correct answer is 'False'.

**Question 8**

Correct

Mark 1.00 out of 1.00

For any matrix  $B$ , the quadratic form  $\mathbf{x}^T B^T B \mathbf{x}$  is positive semidefinite.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.



**Question 9**

Incorrect

Mark 0.00 out of 1.00

Find the maximum value of  $Q(\mathbf{x}) = x_1^2 + x_2^2 + x_3^2 + 8x_1x_2 + 8x_1x_3 + 8x_2x_3$  subject to the constrain  $\mathbf{x}^T \mathbf{x} = 1$ .

Answer: ✘

The correct answer is: 9

**Question 10**

Incorrect

Mark 0.00 out of 1.00

Find the maximum value of  $Q(\mathbf{x}) = x_1^2 + x_2^2 + x_3^2 + 16x_1x_2 + 16x_1x_3 + 16x_2x_3$  subject to the constraints  $\mathbf{x}^T \mathbf{x} = 1$  and  $x_1 + x_2 + x_3 = 0$ .

Answer: ✘

The correct answer is: -7