**Department of Mathematics**

**College of Sciences**

**King Saud University**

**Math 246**

**Final exam**

**First semester, 1433-1434H**

**Time: 3 Hrs**

|  |
| --- |
| **Name:** |
| **Student No.** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Question number** | I | II | III | IV | V | VI | total |
| **Answer** |  |  |  |  |  |  |  |

**I.** Let 

(a) Prove that W is a subspace of P2.

(b) Find a basis of W.

**II**- (a) Let



1. Find the Eigen values of A.
2. Find the Eigen space that corresponds to each of the Eigen values.
3. Prove that A is diagonalizable, find P such that P-1AP is diagonal.
4. Find P-1AP.

III- Let *A,B* be nxn matrices, define



1. Prove that is an inner product on .
2. Find the unit circle of .
3. Find if A is symmetric.

IV- Let R3 have the Euclidean inner product. Use Gram Shmidt process to transform the basis into an orthonormal basis, where .

**V-** (a) Let V and W be vector spaces and let be a linear transformation. Prove that T is 1-1 if and only if ker(T)=

VI- If 

(i) Find Ker(T)

(ii) Is T 1-1? Justify your answer.

(iii) Find a matrix representation of T.