Dept of Mathematics
Online examination Nov-2020.
Semester III- Parer- II- Algebra
Sample questions

1. Let S = { (1,0) (1,1)} in $R^2$with usual dot product. Consider the following:
   (i) S is a linearly independent set.
   (ii) S is an orthogonal set
   (iii) S is an orthonormal set
      a) Only (i) is true
      b) (i) and (ii) are true
      c) (i), (ii) and (iii) are all true
      d) None of these

2. Let V = Mn(R), T: V→V be the map defined by T(A) = $(A+A^T)/2$, then
      a) T is not linear
      b) T is not linear
      c) T is a linear with dim ker T = space of skew symmetric matrices
      d) none of above.

3. Let T: V →W be a linear transformation and $\{v_1,v_2,...,v_n\}$ be linear independent subset of V then $\{T(v_1),T(v_2),...,T(v_n)\}$

   a) is always linearly independent
   b) may not be linearly independent
   c) is always linearly dependent
   d) none of these

4. The standard basis of $\mathbf{R}^4$ is

      a) orthogonal basis but not orthonormal
      b) not an orthogonal basis
      c) orthonormal basis
      d) None of these

5. Let T : $\mathbf{R}^2 \rightarrow \mathbf{R}^2$ be the map defined by T(x,y) = (x +2y, x -2 y) Then
   a) T is an invertible linear map
   b) T is not a linear map
   c) T is a linear map but not surjective
   d) T is a linear map but not injective.

6. Which of the following is true?
   a) determinant is n-linear but not skew symmetric
   b) determinant is not n-linear but skew symmetric
   c) determinant is n-linear and skew symmetric
   d) determinant is neither n-linear nor skew symmetric

7. Let $A \in M_3(R)$ and $k \in R$. Then det (kA) =

   a) k det A
   b) -k det A
   c) (3k) det A
   d) k^3 det A

8. Cramer's rule is used to
    a) Find solution of homogeneous system of linear equations
    b) Find the unique solution of non- homogeneous system of linear equations.
    c) Find determinant of the matrix
    d) Find inverse of the matrix

9. The set S = { (1,0,0), (0,1,0), (0,0,1)} in $\mathbf{R}^3$ is

    a) orthogonal but not orthonormal,
    b) orthonormal
    c) not an orthogonal basis
    d) none of these.

10. Which of the following is an inner product on $\mathbf{R}^2$? x = (x_1, x_2) and (y_1, y_2)
    a) $<x, y> = (x_1+x_2)y_1 + (y_1 +y_2)x_2$
    b) $<x, y> = x_1y_1 + x_2y_2$
    c) $<x, y> = x_1y_1 - x_2y_2$
    d) $<x, y> = x_1y_2 + x_2y_1$