1. Evaluate the determinant of the following matrix by cofactor expansion rows or columns of your choice. Explain your reasoning for choosing the rows or columns. 

2. Use row/column reduction along with cofactor expansion to compute the determinant of



3. Evaluate by the method of adjoints where 

4. Let



Determine by Cramer’s method.

5. For what value(s) of x is the following matrix noninvertible?



6. Let  Determine without actually determining .

7. Evaluate determinant of  by row reduction only. Reduce the matrix to row echelon form.

8. Evaluate determinant of  by row reduction only. Reduce the matrix to row echelon form.

9. Let. Determine.

10. By inspection explain why the following matrix is not invertible. Do not try to compute the inverse!



11. If  what is?

12. Prove the following by applying elementary row or column operations



13. Determine  in terms of the determinants of , ,  and .

14. For what values of  is  noninvertible?

15. Let  and  be two vectors from the origin to points  and . Let point  be the midpoint of the line between  and . Express  in terms of  and .

16. Can you find scalars such that  where , ,  and ?

17. In  show that . When do we get equality?

18. Based on 17 show that in  .

19. Find the orthogonal projection of  on .

20. Find equation of all points  such that is orthogonal to vector  where . What is this the equation of?

21. Find all vectors that can be described as  that are orthogonal to .

22. Describe a method to determine the largest interior angle of a triangle.

23. Find a unit vector (vector of unit norm) orthogonal to vectors (3,4,-1) and (5,3,-2).

24. Determine the distance between the point (0,3) and the line 2x+y=5 in  using the method of orthogonal projections.

25. Determine the distance between the point (0,1,-2) and the line x+3y-z=-1 in  using the method of orthogonal projections.

26. Show the identity  when . Assume that the vector dimension is arbitrary.

27. Let  and  be two vectors that form two sides of a triangle. Determine the area of the triangle in terms of  and norms of  and .

Important Notice: You are only responsible for questions 1,2,4,12,16,21

Other questions will not be graded, they are given as additional exercises.

Deadline: December 2