Math 2318 – Linear Algebra ***Exam* 2** ***Review***

*Professor*: Fred Khoury

1. Find the components of the vector  with initial point  and terminal point 
2. Find ***u*** × ***v***, where  and show that ***u*** × ***v***  is perpendicular to ***u*** and to ***v***.
3. Calculate the scalar triple product  of the vectors:
4. 
5. 
6. Given  Compute the vectors

|  |  |  |
| --- | --- | --- |
| 1. ***u*** × ***v*** | 1. ***v*** × ***w*** | 1. ***u*** × **(*v*** × ***w*)** |
| 1. **(*u*** × ***v*)** × ***w*** | 1. ***u*** × **(*v*** −2 ***w*)** |  |
| 1. Unit vector of ***u***, ***v***, and ***w*** | 1. Anglebetween ***v***, and ***w*** |  |
|  |  |  |

1. Determine whether the vectors form an orthogonal set
2. 
3. 
4. 
5. Find the vector component  of ***u*** along ***a*** and the vector component of ***u*** orthogonal to ***a***.

*a)*  *b)* 

*c)*  *d)* 

1. Find the area of the parallelogram determined by the given vectors 
2. Use the cross product to find a vector that is orthogonal to both 
3. Find the area of the triangle with the given vertices:

*a)*  *b)* 

1. Find the volume of the parallelepiped with sides ***u***, ***v***, and ***w***.



1. Which of the following are linear combinations?
2. 
3. 
4. 
5. 
6. Show that the vector ***w*** is a subspace of ?
7. All vectors of the form ***w*** = (*a*, 0, 0)
8. ***w*** = (*a*, *b*, *c*), where *a* + *c + b* = 0, *a, b, c* are real numbers
9. ***w*** = (*a*, *b*, *c*), where *b* = *a* + *c*, *a, b, c* are real numbers
10. Determine whether the given vectors span 
11. 
12. 
13. Determine whether the vectors are linearly independent or linearly dependent
14. (1, 1, −1), (2, −3, 1), (8, −7, 1)
15. (1, −2, −3), (2, 3, −1), (3, 2, 1)
16. (1, −2, 1), (1, 2, −1), (7, −4, 1)
17. (1, −3, 7), (2, 0, −6), (3, −1, −1), (2, 4, −5)
18. 
19. Find the coordinate vector of ***w*** relative to the basis  for 
20. 
21. 
22. Find the coordinate vector of ***v*** relative to the basis 
23. 
24. 
25. Given the matrix *A* and *b*:
26. Reduce *A* to row-reduced echelon form.
27. What is the dimension of *A*?
28. What is the rank of *A*?
29. What are the pivots?
30. What are the free variables?
31. Find the special (homogeneous) solutions.
32. What is the nullspace ?
33. Find the particular solution to 
34. Give the complete solution.
35. 
36. 
37. 
38. Find the standard matrix for the operator *T* defined by the formula
39. 
40. 

***Solution***

1. (5, 6, −12)
2. (2, −7, −6), ***u*** × ***v***  is orthogonal to both ***u*** and ***v***.
3. *a*) 49 *b*) −92
4.   

  



   

1. 
2.  

 

1. 
2. 
3. 
4. 16
5. 







1. 





1. 



1. 









1. 



1. 





1. 
2. *Dim* = 1
3. *Rank* = 3
4. 
5. 
6. 
7. 
8.  
9. 



1. 
2. *Dim* = 3
3. *Rank* = 1
4. 
5. 
6. 
7. 
8. 
9. 



1. 
2. *Dim* = 2
3. *Rank* = 2
4. 
5. 
6. 
7. 
8. 
9. 
10. 

