

Test 1 Review:

1. For $\vec{u} = \langle 2, -1 \rangle$ and $\vec{v} = \langle -7, 8 \rangle$, find $|4\vec{u} - 2\vec{v}|$
2. Find a vector with a magnitude of 3 in the direction of $\vec{v} = 24\hat{i} - 10\hat{k}$
3. For the vectors $\vec{u} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{v} = 11\hat{i} - 7\hat{k}$ Find:
 - a. $\vec{u} \cdot \vec{v}$
 - b. $|\vec{u}|$
 - c. $|\vec{v}|$
 - d. The angle between \vec{u} and \vec{v}
 - e. The Scalar Projection of \vec{u} onto \vec{v}
 - f. The Vector Projection of \vec{u} onto \vec{v}
4. Find the length and direction of $\vec{u} \times \vec{v}$ For $\vec{u} = \langle -7, -2, -3 \rangle$ and $\vec{v} = \langle 4, 4, 2 \rangle$
5. For the points $P(-1, 1, -2)$, $Q(-2, 0, 1)$, and $R(0, -2, -1)$ find:
 - a. The area of the triangle PQR
 - b. A Unit vector Perpendicular to the plane containing PQR
6. Find the volume of the parallelepiped with the vertices $P(1, 1, 1)$, $Q(2, 1, 3)$, $R(-1, 0, 3)$, and $S(4, -1, 2)$
 - a. How could you have determined whether these points were coplanar?
7. For the vectors $\vec{u} = \langle -12, 3, -3 \rangle$, $\vec{v} = \langle 4, -1, 1 \rangle$, and $\vec{w} = \langle 0, 1, -4 \rangle$ Determine which are parallel and which are perpendicular.
8. Find the equation of the line passing through the point $(-7, 1, -7)$ and parallel to $\vec{v} = 3\hat{i} + 2\hat{j} + 3\hat{k}$
9. For the following lines, determine whether the lines intersect, are parallel, or are skew:

$$L_1: x = -1 + 3t, y = -2 + 3t, z = 3 + t$$

$$L_2: x = 1 + 4t, y = -2 + 6t, z = 4 + t$$

If they intersect, find the point of intersection.

10. If the planes intersect, find the angle between them:

$$3x - y + 2z = 2, \text{ and } 2x + 3y + z = 4$$

11. Find the distance between the point $(3, 1, 2)$ and the plane $2x - 3y + 4z = 7$

12. Find the distance between the planes $x + 2y - 4z = 1$ and $2x + 4y - 8z = 14$

13. Find the distance between the point $(1, -2, 3)$ and the line $\frac{x+2}{3} = \frac{y-1}{1} = \frac{z+3}{2}$

14. Find the point where the line

$$x = -4 + 3t, y = -1 + 5t, z = 3 + 4t \text{ meets the plane } x + y + z = -2$$

15. Identify and sketch the following surface $4x^2 + 9z^2 = y^2$

16. Identify and sketch the following surface $z = \sin y$

17. Be able to identify all of the Cylinders and Surfaces covered in class from their EQUATIONS and then be able to give relevant TRACES and a fairly decent sketch. (Sorry no examples of these, just use your notes here)

18. Be able to do the conversions with Rectangular, Cylindrical, and Spherical coordinates and equations that we did in class.