

1. Given the following vectors: $a = \langle 2, 0, -3 \rangle$, $b = \langle -4, -7, 1 \rangle$, $c = \langle 1, 1, -1 \rangle$
 - a. Find $(a \cdot c)b$ and $(a \cdot b)c$. Are they equal?
 - b. Are they orthogonal? How do you know if vectors are orthogonal?

2. Given the following vectors: $a = \langle 3, -1, 2 \rangle$, $b = \langle 1, -1, -2 \rangle$
 - a. What is the angle between them?
 - b. Are they orthogonal?

3. Find the determinant for the following vectors: $a = \langle 1, -1, 7 \rangle$, $b = \langle 2, 0, 3 \rangle$

4. Find the area of the parallelogram with adjacent sides $a = \langle 3, 2, 0 \rangle$ and $b = \langle 0, 2, 1 \rangle$.

5. What is the symmetric representation of the line? The parametric representation? The standard representation?

6. Are the following lines parallel, intersect, or skew?

a. $L1: 3x=y+1=2z$ // $L2: x=6+2t, y=17+6t, z=9+3t$

b. $L1: x=y-1=-z$ and $L2: x-2=-y=(z/2)$

7. Given the following point and the normal vector, find the line's equation:

a. $P(0,0,0)$, $n=3i-2j+4k$

b. $P(3,2,2)$, $n=2i+3j-k$

8. Find the distance from the point $P(1,5,-4)$ to the plane of equation $3x-y+2z-6=0$.

9. Name the 6 common types of Quadratic Surfaces. What are their most distinguishable characteristics? What are their traces?

10. What are the 3 ways to find curvature / arclength? When do you use each?

11. Find the curvature of $r(t) = \langle 2\sin t, 5t, 2\cos t \rangle$.