

CS402 - Fall 2005
Math for Graphics

1. $P = (1, 1, 1)$ and $Q = (3, 5, 6)$. Find the magnitude of the vector from P to Q.
2. Check to see if the following vectors are linearly independent: $(1, 2, 1)$, $(2, 1, 3)$, and $(3, 3, 3)$.
3. Using $i = (1, 0, 0)$, $j = (0, 1, 0)$ and $k = (0, 0, 1)$, show that any vector in 3 space can be written as a linear combination of i , j , and k .
4. Using problem 3, find the vector with tail at $(-4, 2, 7)$ and head at $(2, 3, 10)$. Hint: Each of the points can be thought of as a vector whose tail is at the origin and whose head is at the given point.
5. Suppose vector $v = 10i - j + 14k$, $w = 6i + 7j - 8k$. Find $v + w$, $\frac{1}{2}w$ and the magnitude of v . Find a unit vector in the direction of v . HINT: To find a unit vector, divide by the magnitude.
6. Find the angle between b and w in exercise 5.
7. Check to see which pairs of vectors are perpendicular:
 - (a) $v = i + j$ and $w = i - j + k$
 - (b) $v = 2i + 3k$ and $w = -3i + 72j - 2k$
 - (c) $v = -2i + 2j - 2k$ and $w = 2i - 2j + 2k$
8. Find the projection of b onto a :
 $a = (i + j)/\sqrt{2}$ and $b = 2i + 3j - k$
9. Prove that cross product is not associative.
10. Find a vector that is perpendicular to $i + 3j - 2k$ and $2i + 2k$.