

CSCI 480, Fall 2015, Math Homework # 1

Name _____ Number _____

Show your work. Explain, in each case, how you got a particular numerical result. You may, of course, use a computer for numeric computations, but which expressions you used to get each result must be made clear. For example, you can't just put down 12, you must put down $2^2 + 2^2 + 2^2 = 12$. You can't just put down 4.443, you must put down $\pi \cdot \sqrt{2} = 4.443$

If you have trouble writing neat math, consider learning and using L^AT_EX.

1. Let $v = \langle 2, 2, 1 \rangle$ and $w = \langle 1, -2, 0 \rangle$. Find the following:

(a) $v \cdot w$

(b) $v \times w$

(c) The vector projection of w on v .

2. Orthogonalize each of the following vectors:

(a) $v_1 = \langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0 \rangle$

(b) $v_2 = \langle -1, 1, -1 \rangle$

(c) $v_3 = \langle 0, -2, -2 \rangle$

3. Find the cosine of the angle between the vectors $v = \langle 1, 2, 3 \rangle$ and $w = \langle 3, 2, 1 \rangle$

4. Let $v = \langle 4, 3, -1 \rangle$. Decompose v into the sum of two vectors, one of which is parallel to $n = \langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0 \rangle$, and the other is perpendicular.

(a) Parallel:

(b) Perpendicular:

5. For the picture below, find:

(a) The coordinates of q in the frame $\langle p, u, v \rangle$

(b) The coordinates of q in the frame $\langle p, u, w \rangle$

(c) The coordinates of q in the frame $\langle p, v, w \rangle$

(d) The coordinates of p in the frame $\langle q, u, v \rangle$

(e) The coordinates of p in the frame $\langle q, u, w \rangle$

(f) The coordinates of p in the frame $\langle q, v, w \rangle$

