CMSC427 Fall 2017

Hw 3 – Vectors

Due by start of class Tuesday, Sept. 11th
On paper or online on Canvas (your choice)

1. Warm up. Is the angle between <2,3,2> and <-3,1,2> obtuse or acute?

2. For what values of α is **a** orthogonal to **b** – α**a**? What about the special case where ||**a**|| = 1? The case where ||**a**|| = 0?

3. Given a helix curve in parametric vector form as P(t) = < r*cos(t), h*t, r*sin(t)>, what is the tangent vector T to the curve? What is the normal vector N (which is T')? And what is the binormal vector B (which is T x N)?

4. For the previous problem the appropriate range of t isn't important – for actually drawing a helix, picking the range of t to appropriate scale h and the number of twists is important. Redo the helix equation so as t goes from 0 to 1, the helix makes N full turns and rises to a height h.

5. For the lecture example for the midpoint of a triangle, calculated by first blending the line segment between two points P0 and P1, and then blending that equation with the third point P2, show that (a) if you hold s constant then varying t sweeps out a line, and (b) those lines of constant s are parallel to the line from P0 to P1.

6. If you have a • (b x c) = 0, what does it mean for the relationship of the three vectors?

7. Find the normal vector to the triplets below, if it exists:

a) P1=(1,1,1), P2=(1,2,1), P3=(3,0,4)

b) P1=(8,16,2), P2=(-8,-16,-2), P3=(4,8,1)