Lecture 2

Wednesday, January 11, 2023 1:19 PM

Questions....

* Distance formula (see Lecture 1's note)

$P(a,b,c)$, $Q(d,e,f)$

$PQ = \sqrt{(a-d)^2+(b-e)^2+(c-f)^2}$ (Pythagorean theorem)

* Sphere:

$(x-a)^2+(y-b)^2+(z-c)^2 = r^2$

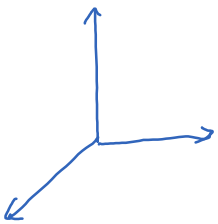
is the equation of the sphere centered at (a,b,c) with radius r.

Inside the sphere: $(x-a)^2+(y-b)^2+(z-c)^2 \le r^2$

Outside the sphere: $(x-a)^2+(y-b)^2+(z-c)^2 \ge r^2$

Vector $u = (a,b,c)$: based at the origin, ending at (a,b,c)

$v = (d,e,f)$



Addition: $u+v = (a+d, b+e, c+f)$

geometrically, this is the parallelogram's rule

Scaling: $\alpha u = (\alpha a, \alpha b, \alpha c)$

Product: ~~$uv = (ac, be, cf)$~~ (this definition is not useful)

There are (at least) two types of products of vectors. This is because a vector carries more data than a number. Different kinds of products represent different relations between two vectors.

Dot product & Cross product

$u \cdot v = ac + be + df$

Dot product helps us determine the angle between two vectors.