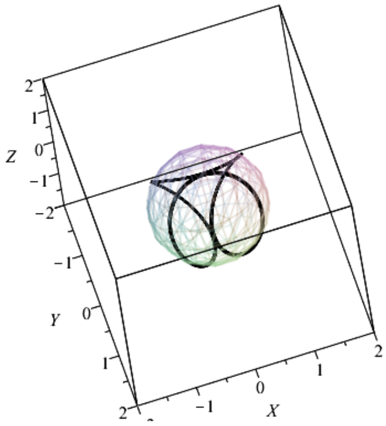
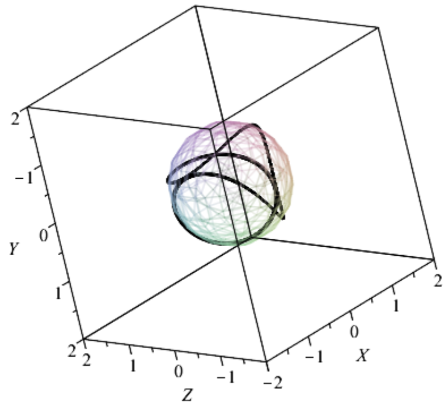


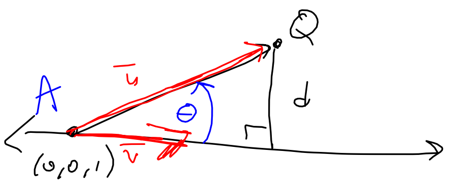


All who scheduled Test for tomorrow, 9 a.m., need to reschedule to 9:30. I'm in class 'til 9:30.

$\mathcal{L}$: p 6 $\quad \vec r(t) = \langle 0,0,1\rangle + t\langle 1,-1,5\rangle = \vec r_0 + t\vec v$ $\quad \boxed{\vec r_0 = \langle 0,0,1\rangle}$

$\vec r(1) = \langle 1,-1,6\rangle \qquad Q = (1,-1,10) \qquad \boxed{\vec v = \langle 1,-1,5\rangle}$

Distance from $\mathcal{L}$ to Q.



Approach:

$$\boxed{\frac{d}{\|\vec u\|} = \sin\theta}$$

Let d = Distance from $\mathcal{L}$ to Q.

$$d = \|\vec u\|\sin\theta = \cancel{\|\vec u\|}\,\frac{\|\vec u\times\vec v\|}{\cancel{\|\vec u\|}\,\|\vec v\|} = \frac{4\sqrt2}{3\sqrt3} = \boxed{\frac{4\sqrt2}{3\sqrt3} = d}$$

$\vec u = \overrightarrow{AQ} = \langle 1,-1,9\rangle$

$\vec u\times\vec v$:

$$\begin{array}{ccccc} 1, & -1, & 9, & 1, & -1 \\ \times\; 1, & -1, & 5, & 1, & -1 \end{array}$$

$\vec u\times\vec v = \langle 4,4,0\rangle$

$$\Longrightarrow \boxed{\begin{array}{l} \|\vec u\times\vec v\| = \sqrt{4^2+4^2} = 4\sqrt2 \\ \|\vec v\| = \sqrt{1^2+1^2+5^2} = \sqrt{27} \end{array}} = 3\sqrt3$$

From the 2012 test (on which I believe the videos are based for Test 1)

#3b - I will GIVE you the line, rather than re-use the line from #1

#4c - **B** is a pain in the neck. So, like the 13.4 exercise, I'll just want to know its VALUE at a particular point.

$$\bar{T} = \frac{\bar{r}'}{\|\bar{r}'\|}$$

$$\bar{N} = \frac{\bar{T}'}{\|\bar{T}'\|}$$

$\bar{B} = \bar{T} \times \bar{N}$, but $\bar{B}(0)$, say, is much easier than $\bar{B}(t)$, in general.

$\bar{T}(0)$ & $\bar{N}(0)$ much easier to work with.

$$\bar{r} = \langle 1, t, t^2 \rangle = \bar{r}(t)$$

$$\bar{T} = \frac{\langle 0, 1, 2t \rangle}{\sqrt{0^2 + 1^2 + 4t^2}} = \frac{1}{\sqrt{4t^2+1}} \langle 0, 1, 2t \rangle = (4t^2+1)^{-\frac{1}{2}} \langle 0, 1, 2t \rangle$$

$$\Rightarrow \bar{N} = \frac{\bar{T}'}{\|\bar{T}'\|} = \frac{-4t(4t^2+1)^{-\frac{3}{2}} \langle 0, 1, 2t \rangle + (4t^2+1)^{-\frac{1}{2}} \langle 0, 0, 2 \rangle}{\text{NOT Super Bad...}}$$

$$-\frac{8t}{2} = -4t$$

Find $\bar{T}(0)$, $\bar{N}(0)$, $\bar{B}(0)$

$\bar{T}(0) = \langle 0, 1, 0 \rangle$

$\bar{N}(0) = \langle 0, 0, 2 \rangle$

$\bar{B}(0) = \bar{T} \times \bar{N}$:

$$\begin{array}{r} 0, 1, 0, 0, 1 \\ \times \quad 0, 0, 2, 0, 0 \\ \hline \end{array}$$

$\bar{B}(0) = \langle 2, 0, 0 \rangle$

$$\|\bar{T}'\| = \left\| \left\langle 0, (4t^2+1)^{-\frac{1}{2}}, \frac{2t}{(4t^2+1)^{1/2}} \right\rangle \right\|$$

$$= \sqrt{(4t^2+1)^{-1} + \frac{4t^2}{4t^2+1}} = \sqrt{\frac{4t^2+1}{4t^2+1}} = 1$$

, which I knew all along. (yeah, right.)

$\bar{r}(t) = \langle 1, t, t^2 \rangle$

$\bar{r}'(t) = \langle 0, 1, 2t \rangle$

$\bar{T} = \frac{1}{(4t^2+1)^{\frac{1}{2}}} \langle 0, 1, 2t \rangle$

$\bar{T}' = \frac{-8t}{2(4t^2+1)^{3/2}} \langle 0, 1, 2t \rangle + \frac{1}{(4t^2+1)^{\frac{1}{2}}} \langle 0, 0, 2 \rangle$

$= -4t(4t^2+1)^{-\frac{3}{2}} \langle 0, 1, 2t \rangle + (4t^2+1)^{-\frac{1}{2}} \langle 0, 0, 2 \rangle$

$= \langle 0, -4t(4t^2+1)^{-\frac{3}{2}}, -8t^2(4t^2+1)^{-\frac{3}{2}} \rangle + \langle 0, 0, 2(4t^2+1)^{-\frac{1}{2}} \rangle$

$= \langle 0, -4t(4t^2+1)^{-\frac{3}{2}},$

$\Rightarrow \|\bar{T}'\| = 0^2$