

```
with(Student[VectorCalculus]) :  
SetCoordinates(cartesian[x, y, z])
```

*cartesian*<sub>x, y, z</sub>

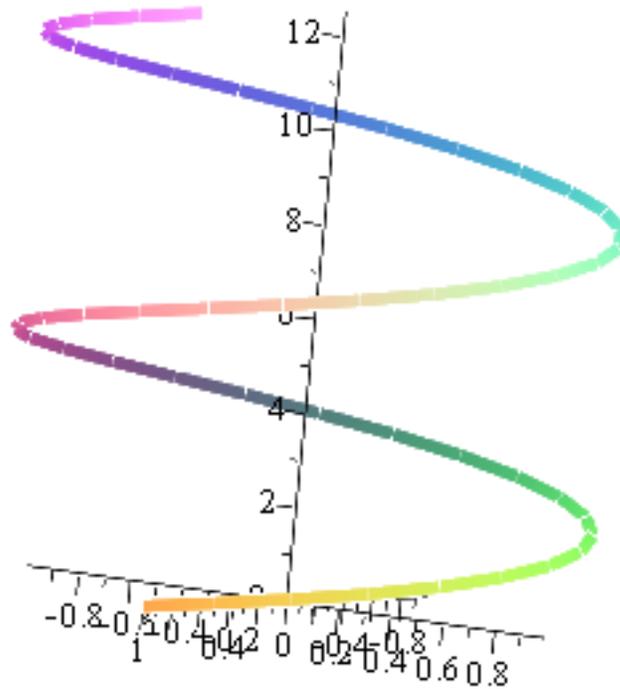
(1)

```
helice := <cos(t), sin(t), t>
```

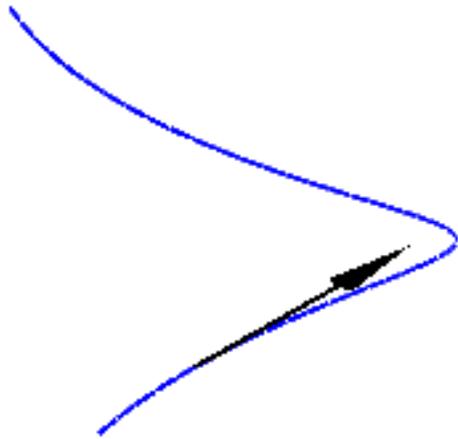
$(\cos(t))e_x + (\sin(t))e_y + (t)e_z$

(2)

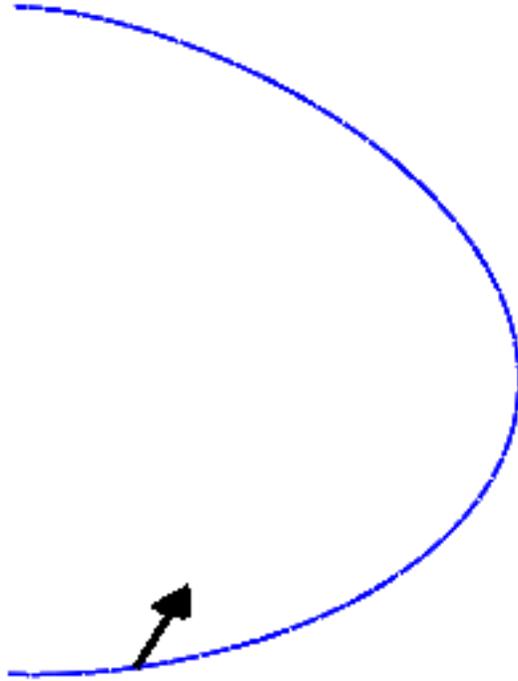
```
SpaceCurve(helice, t = 0 .. 4 · Pi, axes = normal, thickness = 5)
```



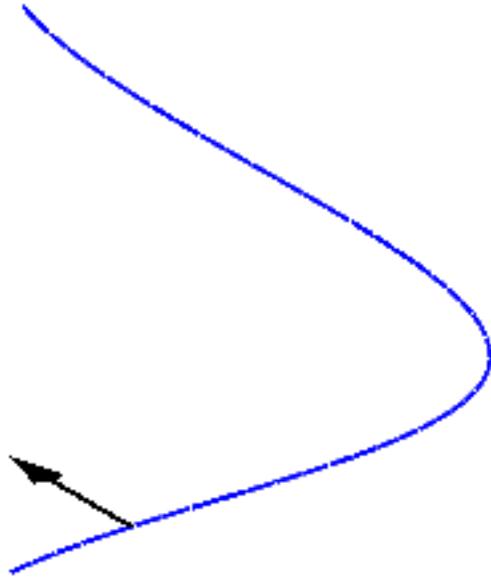
```
TangentVector(helice, output = animation)
```



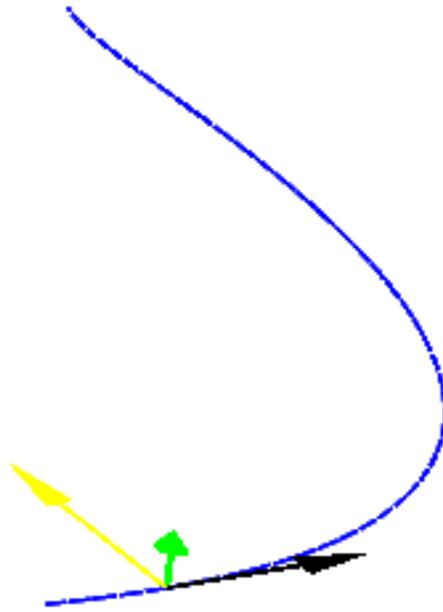
*PrincipalNormal(helice, output = animation)*



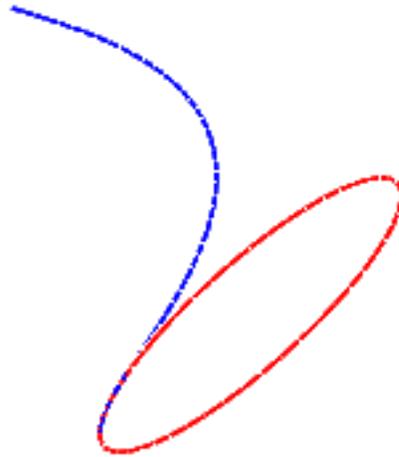
*Binormal(helice, output = animation)*



*TNBFrame(helice, output = animation)*



*RadiusOfCurvature(helice, output = animation)*



*Curvature(helice)*

$$\frac{1}{4} \sqrt{2 \sin(t)^2 + 2 \cos(t)^2} \sqrt{2} \quad (3)$$

*Torsion(helice)*

$$\frac{1}{2} \quad (4)$$

Ejercicio.-Realizar las rutinas anteriores con las siguientes curvas

$$c_1 := \langle \cos(t), \sin(t), 4 \cos^2(t) \rangle :$$

$$c_2 := \langle 2 \sin(t) \cos(3t), t \rangle :$$

$$c_3 := \langle 2 \cos(t), 2 \sin(t), 4 \cos(t) + 1 \rangle :$$

Es decir grafica la curva, graficas los vectores Tangente, Normal y Binormal, asi como el circulo osculador la curvatura y la torsion