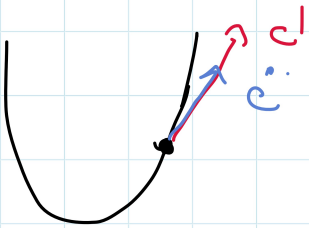
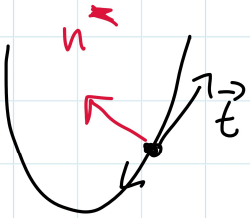
Pf: $c(t) = (t, t^2)$

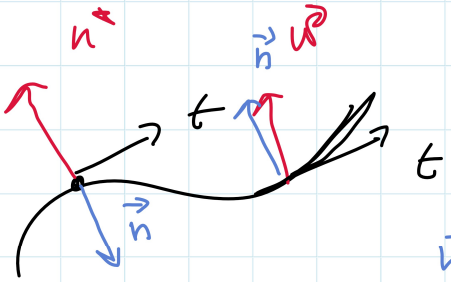
$t = 2s$

$\|c'\| \neq 0$



$$\vec{t} = \frac{c'}{\|c'\|}$$

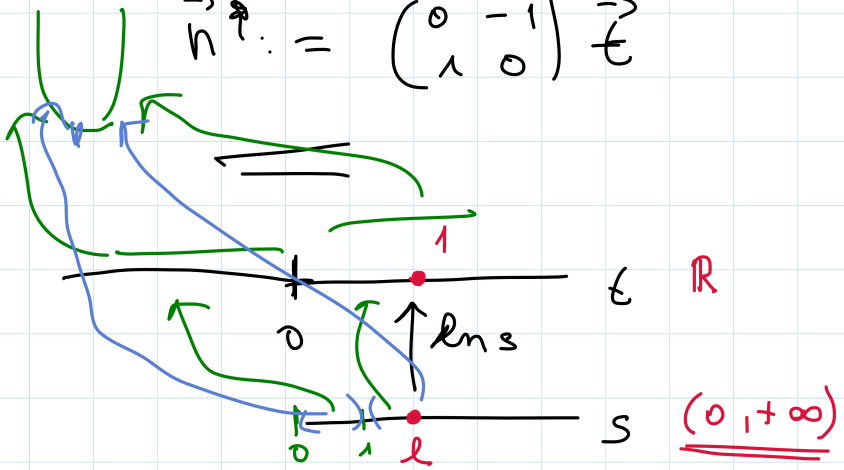




$\vec{n} = \pm n_*$

sign κ_z

$$\vec{n}^* = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \vec{t}$$

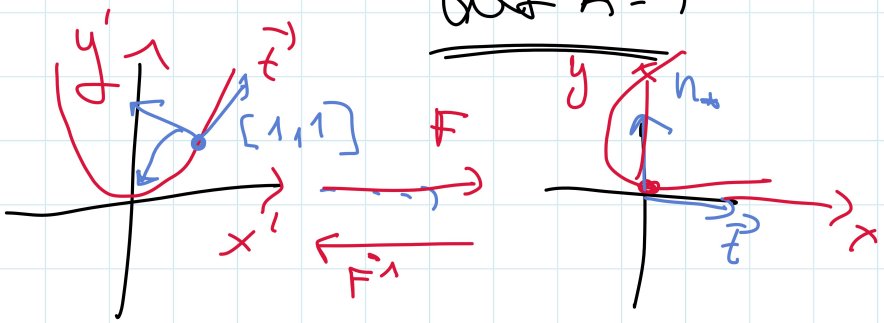


$$\begin{pmatrix} x \\ y \end{pmatrix} \longrightarrow \underbrace{\begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix}}_{A} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} a_1 \\ a_2 \end{pmatrix}$$

$\det A = 1$

$A \cdot A^T = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

$A^{-1} = A^T$



$$\vec{t} = \frac{1}{\sqrt{5}} \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad \cdots \rightarrow \quad \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

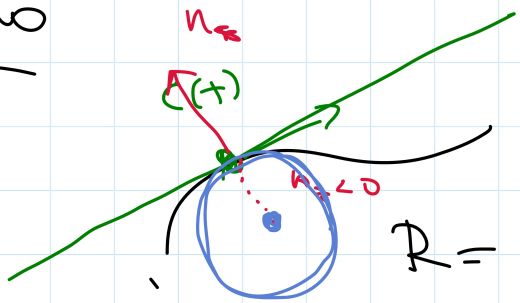
$$A^{-1} = \begin{pmatrix} \frac{1}{\sqrt{5}} & -\frac{2}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} & \frac{1}{\sqrt{5}} \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \frac{1}{\sqrt{5}} \begin{pmatrix} 1 & -2 \\ 2 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{\sqrt{5}} \begin{pmatrix} 1 & 2 \\ -2 & 1 \end{pmatrix} \left[\begin{pmatrix} x' \\ y' \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \end{pmatrix} \right] =$$

$$= \frac{1}{\sqrt{5}} \begin{pmatrix} 1 & 2 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix} - \frac{1}{\sqrt{5}} \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

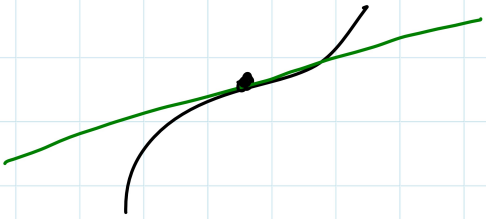
1.10

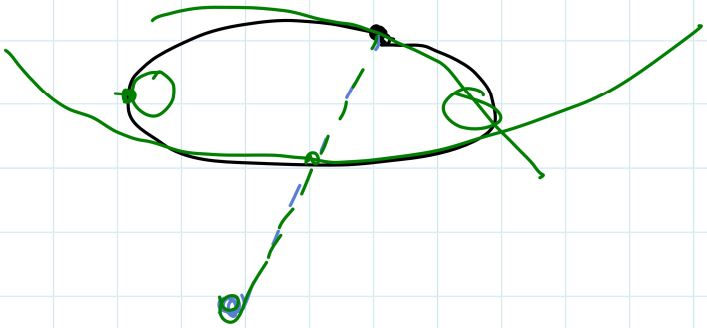


$$R = \frac{1}{\kappa_z}$$

OSKULAČNÍ KRUŽNICE

$$\langle \vec{t}' \rangle = \langle e' \rangle = -\langle \dot{e} \rangle$$





In[10]:=
```
c = {t, t^2}
```
Out[10]=
$$\{t,\ t^2\}$$

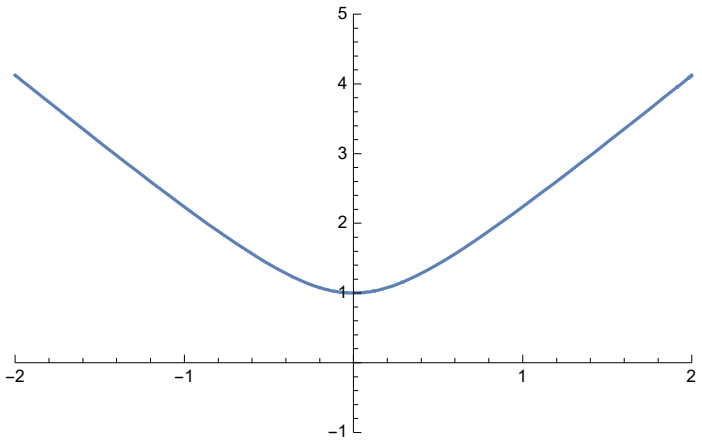
In[18]:=
```
pl1 = ParametricPlot[c, {t, -2, 2}];
```

In[33]:=
```
dc = D[c, t]
ddc = D[dc, t]
```
Out[33]=
$$\{1,\ 2\,t\}$$

Out[34]=
$$\{0,\ 2\}$$

In[13]:=
```
r = Sqrt[dc.dc]
```
Out[13]=
$$\sqrt{1 + 4\,t^2}$$

In[15]:=
```
Plot[r, {t, -2, 2}, PlotRange → {{-2, 2}, {-1, 5}}]
```
Out[15]=



In[23]:=
```
c1 = c /. {t → 1}
```
Out[23]=
$$\{1,\ 1\}$$

In[28]:=
```
vt1 = (dc / r) /. {t → 1}
```
Out[28]=
$$\left\{\frac{1}{\sqrt{5}},\ \frac{2}{\sqrt{5}}\right\}$$

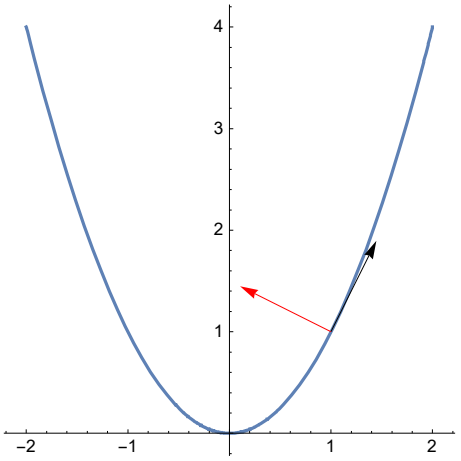
In[29]:=
```
{{0, -1}, {1, 0}} // MatrixForm
```
Out[29]//MatrixForm=
$$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

In[27]:=
```
vn1 = {{0, -1}, {1, 0}}.vt1
```
Out[27]=
$$\left\{-\frac{2}{\sqrt{5}},\ \frac{1}{\sqrt{5}}\right\}$$

In[30]:=
```
pl2 = Graphics[Arrow[{c1, c1 + vt1}]];
pl3 = Graphics[{Red, Arrow[{c1, c1 + vn1}]}];
```

In[32]:=
```
Show[pl1, pl2, pl3]
```

Out[32]=

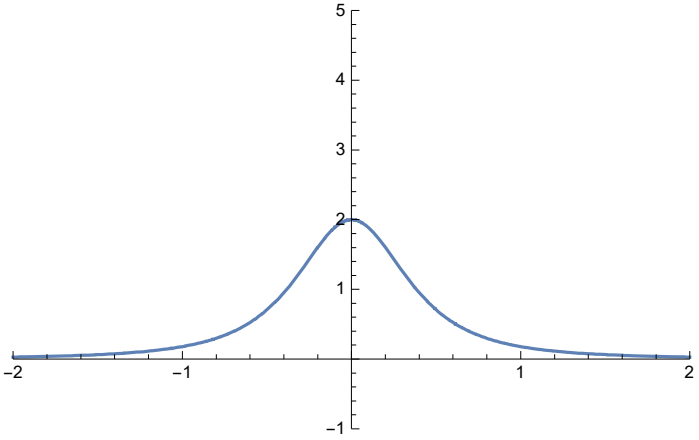


In[35]:=
```
kz = Det[{dc, ddc}] / r^3
```

Out[35]=
$$\frac{2}{\left(1 + 4\ t^2\right)^{3/2}}$$

In[36]:=
```
Plot[kz, {t, -2, 2}, PlotRange → {{-2, 2}, {-1, 5}}]
```

Out[36]=



In[37]:=
```
kz1 = kz /. {t → 1}
```

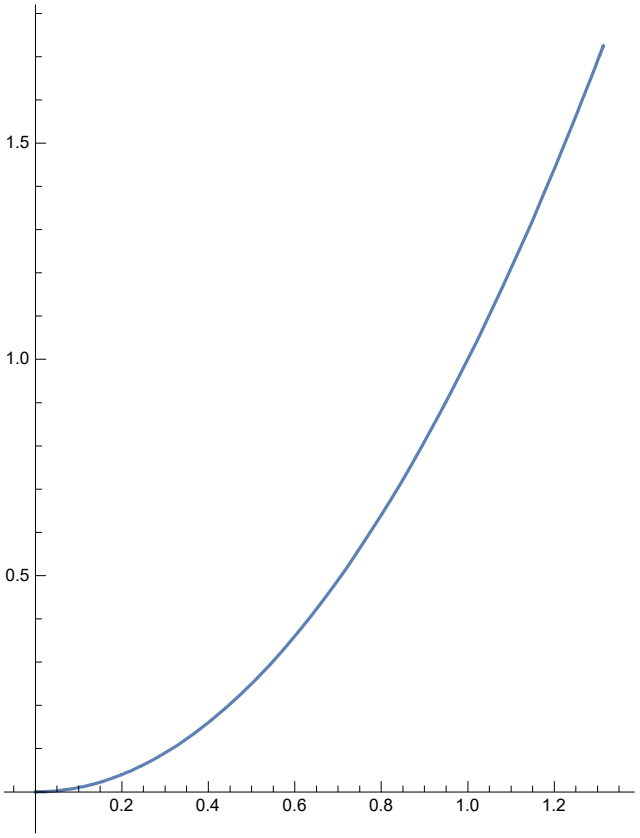
Out[37]=
$$\frac{2}{5\sqrt{5}}$$

In[40]:=
```
cc = c /. {t → Log[s]}
```

Out[40]=
$$\{\text{Log}[s],\ \text{Log}[s]^2\}$$

In[48]:=
```
ParametricPlot[cc, {s, 1, E + 1}]
```

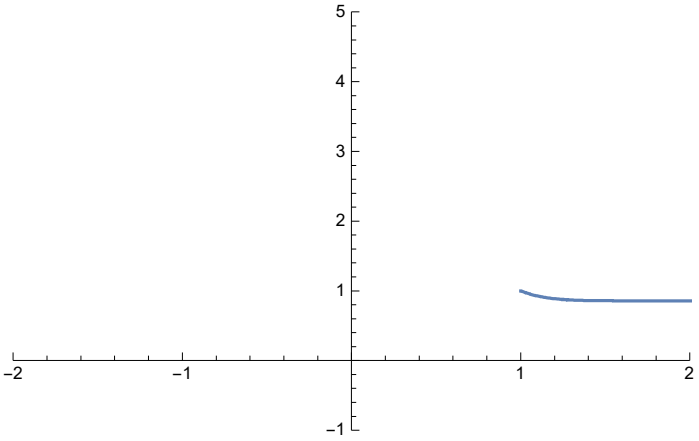
Out[48]=



In[51]:=
```
rs = Sqrt[D[cc, s].D[cc, s]];
```

In[62]:=
```
Plot[rs, {s, 1, E + 1}, PlotRange → {{-2, 2}, {-1, 5}}]
```

Out[62]=



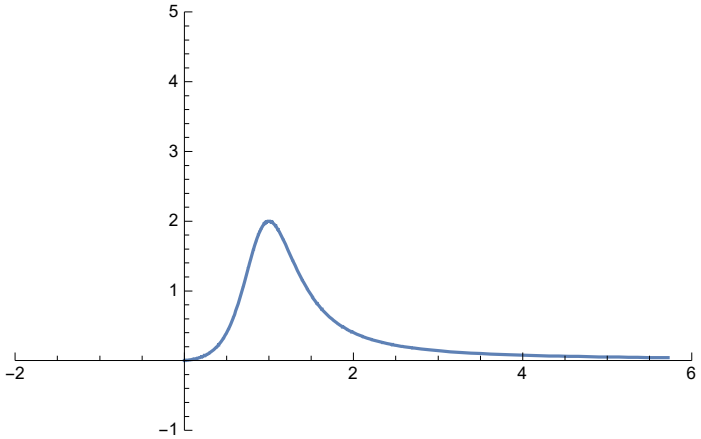
In[80]:=
```
kzs = Simplify[Det[{D[cc, s], D[cc, {s, 2}]}] / Sqrt[D[cc, s].D[cc, s]]^3];
```

In[59]:=
```
kzs /. {s → E}
```

Out[59]=
$$\frac{2}{5\sqrt{5}}$$

In[67]:=
```
Plot[kzs, {s, 0, E + 3}, PlotRange → {{-2, 6}, {-1, 5}}]
```

Out[67]=



In[68]:=
```
vt1
```

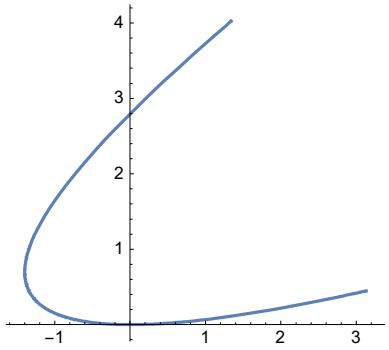
Out[68]= $\left\{\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}\right\}$

In[74]:=
```
cZobr = ({{1, 2}, {-2, 1}} / Sqrt[5]).c - {3, -1} / Sqrt[5]
```

Out[74]= $\left\{-\frac{3}{\sqrt{5}} + \frac{t}{\sqrt{5}} + \frac{2\,t^2}{\sqrt{5}}, \frac{1}{\sqrt{5}} - \frac{2\,t}{\sqrt{5}} + \frac{t^2}{\sqrt{5}}\right\}$

In[76]:=
```
ParametricPlot[cZobr, {t, -2, 2}]
```

Out[76]=



In[79]:=
```
kzZobr =
 Simplify[Det[{D[cZobr, t], D[cZobr, {t, 2}]}] / Sqrt[D[cZobr, t].D[cZobr, t]]^3]
```

Out[79]= $\frac{2}{\left(1 + 4\,t^2\right)^{3/2}}$

In[81]:=
```
kz
```

Out[81]= $\frac{2}{\left(1 + 4\,t^2\right)^{3/2}}$

In[87]:=
```
pevBOD =
 Solve[({{1, 2}, {-2, 1}} / Sqrt[5]).{x, y} - {3, -1} / Sqrt[5] == {x, y}, {x, y}][[1]]
 (*výpočet pevného bodu*)
```

Out[87]= $\left\{x \to -\frac{5 - 3\sqrt{5}}{2\left(-5 + \sqrt{5}\right)}, y \to -\frac{5 + \sqrt{5}}{2\left(-5 + \sqrt{5}\right)}\right\}$

In[88]:= **N[pevBOD]**

Out[88]= {x → -0.309017, y → 1.30902}

In[90]:= **R1 = 1 / kz1**

In[91]:= **S1 = c1 + R1 * vn1**

Out[91]= $\left\{-4, \frac{7}{2}\right\}$

In[100]:= **pl4 = Graphics[{Darker[Darker[Green]], Circle[S1, R1]}];**

In[101]:= **Show[pl1, pl2, pl3, pl4]**

Out[101]=