

Obecne vytahy 1

```
> with(plots);
```

```
[Interactive, animate, animate3d, animatecurve, arrow, changecoords,  
complexplot, complexplot3d, conformal, conformal3d, contourplot,  
contourplot3d, coordplot, coordplot3d, cylinderplot, densityplot,  
display, display3d, fieldplot, fieldplot3d, gradplot, gradplot3d,  
graphplot3d, implicitplot, implicitplot3d, inequal, interactive,  
interactiveparams, listcontplot, listcontplot3d, listdensityplot, listplot,  
listplot3d, loglogplot, logplot, matrixplot, multiple, odeplot, pareto,  
plotcompare, pointplot, pointplot3d, polarplot, polygonplot,  
polygonplot3d, polyhedra_supported, polyhedraplot, replot, rootlocus,  
semilogplot, setoptions, setoptions3d, spacecurve, sparsematrixplot,  
sphereplot, surfdata, textplot, textplot3d, tubeplot ]
```

```
> VstupniPoplatek := .01 * CilovaCastka;
```

```
SP := x -> min(3000, 0.15 * x);
```

```
xi := 0.02;
```

$$VstupniPoplatek := 3000.00$$
$$SP := x \rightarrow \min(3000, 0.15x)$$
$$\xi := 0.02$$

```
>
```

Obecne vztahy a pojmy

```
> StavNaKonciRoku(Datum(Pocatek)[3]-1) := VstupniPoplatek *  
(1+xi)^( (CisloDne(  
Datum(Pocatek)[1], Datum(Pocatek)[2],  
Datum(Pocatek)[3]-1) - Pocatek) / 365.25)
```

```
>
```

Warning, premature end of input

```
> Pol := proc() # pomocna procedura vraci x[j], pokud je x pole a x pokud  
je to jedno cislo  
if nargs <= 2 then  
  args[1]  
else args[args[nargs]]  
fi  
end;
```

```
StavNaKonciRoku := t ->
```

```
`if` (t < Datum(Pocatek)[3], 0,  
StavNaKonciRoku(t-1) * (1+xi) +  
add
```

```

#sum
(
Pol(Ulozky[t],j)[1]*(1+xi)^((CisloDne(31,12,t)-Pol(Ulozky[t],j)[2])/DelkaRoku(t)),j=1..nops([Ulozky[t]]))

-PoplatekZaVedeni*(1+xi)^((CisloDne(31,12,t)-CisloDne(1,3,t))/DelkaRoku(t)) # ocekavam poplatek za vedeni uctu 1. 3.
+
StatniPodpora(t-1)*(1+xi)^((CisloDne(31,12,t)-CisloDne(1,3,t))/DelkaRoku(t))

)
; # ocekavam statni podporu 1. 3.

#for i from 2005 to 2020 do
#i,StavNaKonciRoku(i),nops([Ulozky[i]]),Ulozky[i],(CisloDne(31,12,i)-Pol(Ulozky[i],1#)[2]);
#od;

NasporenaCastka:=t->`if`(t<Datum(Pocatek)[3],0,StavNaKonciRoku(t)-StavNaKonciRoku(t-1)-StatniPodpora(t-1));

StatniPodpora:=t->SP(NasporenaCastka(t));

StavEkv:=tau->
add(
`if`(Datum(UlozkyEkv[i][2])[3]>tau,
0,
UlozkyEkv[i][1])
*(1+'zeta')^((CisloDne(31,12,tau)-Pol(UlozkyEkv[i][2]))/DelkaRoku(t)),
i=1..nops(UlozkyEkv));

```

```

Pol:=proc()
if nargs ≤ 2 then args[1] else args[args[nargs]] end if
end proc

```

$$StavNaKonciRoku := t \rightarrow \text{`if} \left(t < Datum(Pocatek)_3, 0, \right.$$

$$\left. StavNaKonciRoku(t-1)(1+\xi) + add \left(\right. \right.$$

$$\begin{aligned}
& \left. \begin{aligned}
& \text{Pol}(Ulozky_p, j) (1 + \xi) \left(\frac{\text{CisloDne}(31, 12, t) - \text{Pol}(Ulozky_p, j)}{\text{DelkaRoku}(t)} \right) \\
& j = 1 \dots \text{nops}([Ulozky_t])
\end{aligned} \right) \\
& - \text{PoplatekZaVedeni} (1 + \xi) \left(\frac{\text{CisloDne}(31, 12, t) - \text{CisloDne}(1, 3, t)}{\text{DelkaRoku}(t)} \right) \\
& + \text{StatniPodpora}(t - 1) (1 + \xi) \left(\frac{\text{CisloDne}(31, 12, t) - \text{CisloDne}(1, 3, t)}{\text{DelkaRoku}(t)} \right)
\end{aligned}$$

$NasporenaCastka := t \rightarrow \text{if}(t < \text{Datum}(Pocatek), 0,$

$\text{StavNaKonciRoku}(t) - \text{StavNaKonciRoku}(t - 1)$
 $- \text{StatniPodpora}(t - 1))$

$\text{StatniPodpora} := t \rightarrow \text{SP}(\text{NasporenaCastka}(t))$

$$\begin{aligned}
& \text{StavEkv} := \tau \rightarrow \text{add} \left(\text{if} \left(\tau < \text{Datum}(UlozkyEkv_{i_2}), 0, UlozkyEkv_{i_1} \right) \right. \\
& \left. (1 + \zeta) \left(\frac{\text{CisloDne}(31, 12, \tau) - \text{Pol}(UlozkyEkv_{i_2})}{\text{DelkaRoku}(t)} \right), i = 1 \dots \text{nops}(UlozkyEkv) \right)
\end{aligned}$$

Data a vypocty

```
> Pocatek:=CisloDne(1,11,2006);
CilovaCastka:=300000;
```

$Pocatek := 2495$

$CilovaCastka := 300000$

```
> A:=NULL;
```

```
for z from 1000 by 2000 to 22000 do
Ulozky:='Ulozky';NULL;
for t from 2005 to 2020 do
x:=0.;
Ulozky[t]:=[x,CisloDne(31,1,t)]
od;
Ulozky[ Datum(Pocatek)[3] ]:=[VstupniPoplatek,Pocatek];
for t from 2006 to 2006+6 do
x:=z;
```

```
Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]  
od;
```

```
UlozkyEkv:=convert(Ulozky,list);
```

```
CilovaCastka:=StavNaKonciRoku(2012);  
VstupniPoplatek:=.01*CilovaCastka;
```

```
rce:=StavNaKonciRoku(2012)=StavEkv(2012);  
A:=A,[x,fsolve(rce)];  
od;
```

A:=

```
> nops([A]);
```

```
> pointplot([A],title="Vynosnost v zavislosti na velikosti ulozek"  
#,style=line  
);
```

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```
> B:=NULL;
```

```
for z from 1000 by 500 to 22000 do  
Ulozky:='Ulozky';NULL;  
for t from 2005 to 2020 do  
x:=PoplatekZaVedeni;  
Ulozky[t]:=[x,CisloDne(31,1,t)]  
od;
```

```

Ulozky[Datum(Pocatek)[3]]:=[VstupniPoplatek,Pocatek];
for t from 2009 to 2006+6 do
x:=z;
Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
od:

```

```

UlozkyEkv:=convert(Ulozky,list):

```

```

CilovaCastka:=StavNaKonciRoku(2012);
VstupniPoplatek:=.01*CilovaCastka:

```

```

rce:=StavNaKonciRoku(2012)=StavEkv(2012):
B:=B,[x,fsolve(rce)];
od:

```

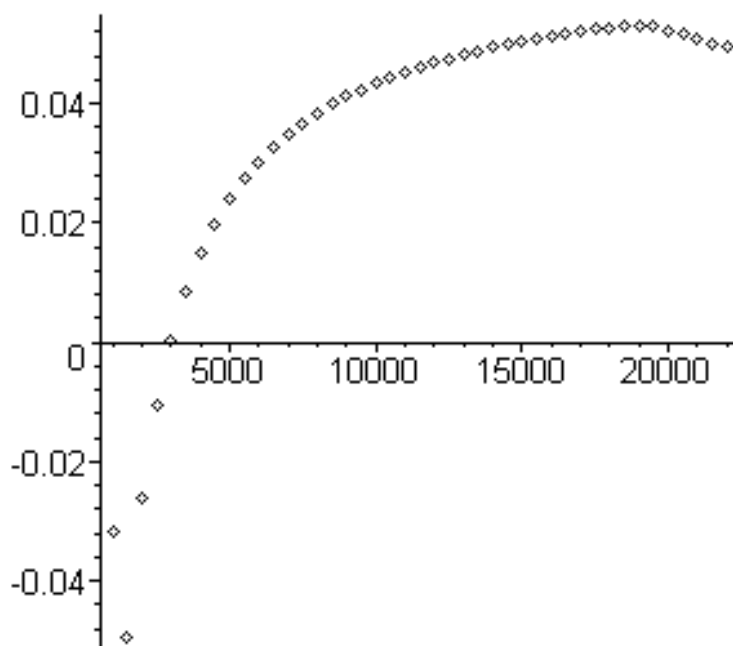
$B :=$

```

> pointplot([B], title="Vynosnost v zavislosti na velikost ulozek
(pri kratzi dobe sporeni)"#,style=line
);

```

Vynosnost v zavislosti na velikost ulozek (pri krat



```

> C:=NULL;
for K from 2006 to 2011 do
#for z from 1000 by 500 to 22000 do
z:=19000;
Ulozky:='Ulozky';NULL;
for t from 2005 to 2020 do
x:=PoplatekZaVedeni;
Ulozky[t]:=[x,CisloDne(31,1,t)]

```

```

od;
Ulozky[Datum(Pocatek)[3]]:=[VstupniPoplatek,Pocatek];
for t from K to 2006+6 do
x:=z;
Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
od:

```

```
UlozkyEkv:=convert(Ulozky,list):
```

```

CilovaCastka:=StavNaKonciRoku(2012);
VstupniPoplatek:=.01*CilovaCastka:

```

```

rce:=StavNaKonciRoku(2012)=StavEkv(2012):
C:=C,[2012-K,fsolve(rce)];
od:

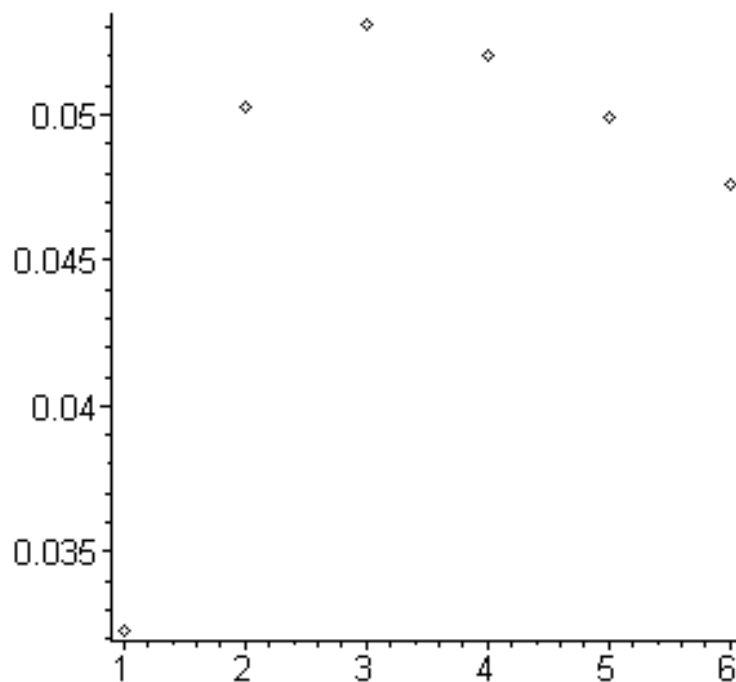
```

C:=

```

> pointplot([C], title="Vynosnost v zavislosti na delce sporeni");
Vynosnost v zavislosti na delce sporeni

```



```

> E:=NULL;
for K from 2010 to 2015 do
#for z from 1000 by 500 to 22000 do
z:=19000;
Ulozky:='Ulozky';NULL;
for t from 2005 to 2020 do
x:=PoplatekZaVedeni;
Ulozky[t]:=[x,CisloDne(31,1,t)]
od;

```

```

Ulozky[Datum(Pocatek)[3]]:=[VstupniPoplatek,Pocatek];
for t from 2006 to K do
x:=z;
Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
od:

UlozkyEkv:=convert(Ulozky,list):

CilovaCastka:=StavNaKonciRoku(2012);
VstupniPoplatek:=.01*CilovaCastka:

rce:=StavNaKonciRoku(K)=StavEkv(K):
E:=E,[K-2005,fsolve(rce)];
print(E[nops([E])]);
od:
pointplot([E], title="Vynosnost v zavislosti na delce sporeni");

```

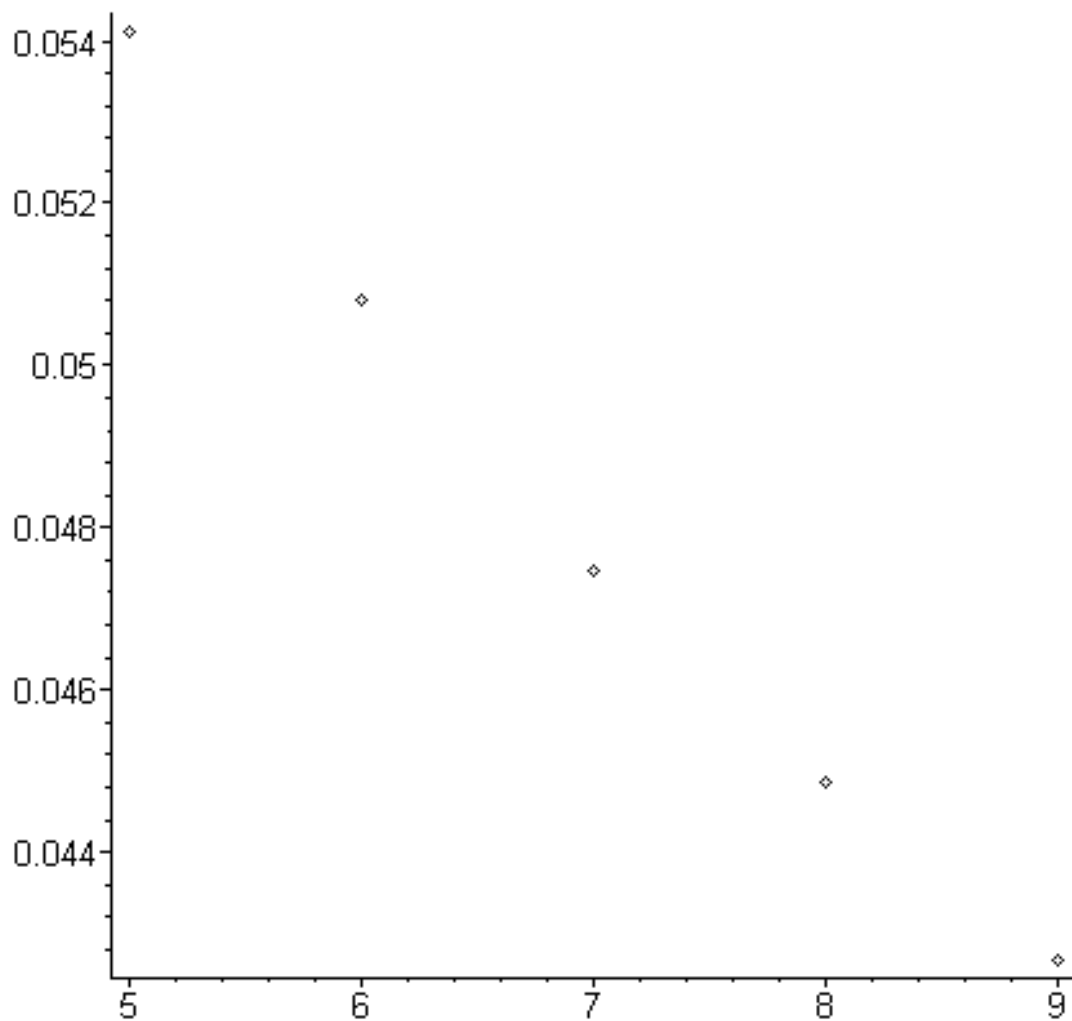
$E :=$
5
[6, 0.05081784075]
[7, 0.04748448685]
[8, 0.04485514718]
[9, 0.04268190454]

```

Warning, computation interrupted
> pointplot([E], title="Vynosnost v zavislosti na delce sporeni");

```

Vynosnost v zavislosti na delce sporeni



```
>
> NadN:=x->`if`(x>0,x,0);
                                     NadN := x → if(0 < x, x, 0)

> NadN(-2);
                                     0

> X:=[0,0,0,21000,20000,18000];
S:=1;
delta:=1000;

while delta>100 do

for kappa from 0 to 0 do
Ulozky:='Ulozky';NULL;
for t from 2005 to 2020 do
x:=PoplatekZaVedeni;
```



```

Ulozky[t]:=[x,CisloDne(31,1,t)]
od;
# print(`....`);
Ulozky[Datum(Pocatek)[3]]:=[VstupniPoplatek,Pocatek];
for t from 2006 to 2011 do
# print(t,aaaaa[kappa][t-2006+1]);
x:=X[t-2006+1];
Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
od:

```

```

UlozkyEkv:=convert(Ulozky,list):

```

```

CilovaCastka:=StavNaKonciRoku(2011);
VstupniPoplatek:=.01*CilovaCastka:

```

```

rce:=StavNaKonciRoku(2011)=StavEkv(2011):
Z[kappa]:=fsolve(rce);
od;

```

```

ZZ:=Z[kappa]; #=Z[0]

```

```

>

```

```

> print(Z[0],X);
for kappa from 0 to 6 do
Ulozky:='Ulozky';NULL;
for t from 2005 to 2020 do
x:=PoplatekZaVedeni;
Ulozky[t]:=[x,CisloDne(31,1,t)]
od;
# print(`....`);
Ulozky[Datum(Pocatek)[3]]:=[VstupniPoplatek,Pocatek];
  XX[kappa]:=[seq(NadN(X[j]-`if`(kappa=j,delta,0)),j=1..6)];#
zaporne ulozky zak.
# print(XX[kappa]);
  for t from 2006 to 2011 do
    x:=XX[kappa][t-2006+1];
    Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
  od:

```

```

UlozkyEkv:=convert(Ulozky,list):

```

```

CilovaCastka:=StavNaKonciRoku(2011);
VstupniPoplatek:=.01*CilovaCastka:

```

```

rce:=StavNaKonciRoku(2011)=StavEkv(2011):
Z[kappa]:=fsolve(rce);
  # print(Z[kappa]);
if Z[kappa]<Z[0] then
  # print(`malo`);
  XX[kappa]:=[seq(NadN(X[j]-`if`(j=kappa,delta,0)),j=1..6)];
  for t from 2006 to 2011 do
    x:=XX[kappa][t-2006+1];
    Ulozky[t]:=Ulozky[t],[x,CisloDne(20,1,t)]
  od:

```

```
UlozkyEkv:=convert(Ulozky,list):
```

```

CilovaCastka:=StavNaKonciRoku(2011);
VstupniPoplatek:=.01*CilovaCastka:

```

```

rce:=StavNaKonciRoku(2011)=StavEkv(2011):
Z[kappa]:=fsolve(rce);
#print(`opravne`,Z[kappa]);
#else print(`dost`);
fi;

```

```

if Z[kappa]>Z[0] then
x:=XX[kappa];
fi;

```

```

od:
>
>
> delta:=delta-round(100/1.5);

```

```
od:
```

$$X := [0, 0, 0, 21000, 20000, 18000]$$

$$S := 1$$

$$\delta := 1000$$

$$0.05249080102 [0, 0, 0, 21000, 20000, 18000]$$

$$0.05396562410 [0, 0, 0, 20000, 19000, 17000]$$

$$0.05427500357 [0, 0, 0, 19067, 19000, 16067]$$

$$0.05449864660 [0, 0, 0, 19067, 19000, 15201]$$

$$0.05470770698 [0, 0, 0, 19067, 19000, 14402]$$

$$0.05490155614 [0, 0, 0, 19067, 19000, 13670]$$

0.05507961799 [0, 0, 0, 19067, 19000, 13005]
 0.05524135460 [0, 0, 0, 19067, 19000, 12407]
 0.05538626986 [0, 0, 0, 19067, 19000, 11876]
 0.05525598287 [0, 0, 0, 19067, 19000, 11876]
 0.05525564006 [0, 0, 0, 19067, 19000, 11876]
 0.05525529761 [0, 0, 0, 19067, 19000, 11876]
 0.05525495498 [0, 0, 0, 19067, 19000, 11876]
 0.05525461231 [0, 0, 0, 19067, 19000, 11876]

[0, 0, 19000, 19000, 19000, 17201]

> .4957438236e-1, [20000, 20000, 20000, 20000, 20000, 20000]
 .5202445659e-1, [12226, 12226, 12226, 18067, 18067, 12422]

 .5294023996e-1, [20, 200, 2000, 20000, 20000, 20000]
 .5505762024e-1, [0, 0, 2000, 19000, 19000, 13876]
 . . .
 .5493548982e-1, [0, 0, 2000, 19000, 19000, 13876]
 ??

>
 >
 >

[0, 1000, 10000, 20000]_{2014,1}

> permute(6)[k];

[1, 2, 3, 5, 4, 6]

> PermutaceSOpakovanim:=a->permute((op(choose(a,a))));

>

PermutaceSOpakovanim :=

a → combinat:-permute(op(combinat:-choose(a,a)))

> i:=2;j:=4;

A:=permute(i);

> B:=permute(A);

i := 2

$j := 4$

$A := [[1, 2], [2, 1]]$

$B := [[[1, 2], [2, 1]], [[2, 1], [1, 2]]]$

> **permute((op(choose(3,3))));**
[[1, 2, 3], [1, 3, 2], [2, 1, 3], [2, 3, 1], [3, 1, 2], [3, 2, 1]]

> **PermutaceSOpakovanim(3);**
[[1, 2, 3], [1, 3, 2], [2, 1, 3], [2, 3, 1], [3, 1, 2], [3, 2, 1]]

>