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;
```

$$VstupniPoplatek := 3000.00$$

$$SP := x \rightarrow \min(3000, 0.15\,x)$$

$$\xi := 0.02$$

```
>
```

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));
```

$Pol := \mathbf{proc}\,()$
  $\mathbf{if}\ \mathrm{nargs} \leq 2\ \mathbf{then}\ \mathrm{args}[\,1\,]\ \mathbf{else}\ \mathrm{args}[\,\mathrm{args}[\,\mathrm{nargs}\,]\,]\ \mathbf{end\ if}$
$\mathbf{end\ proc}$

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

$$\text{StavNaKonciRoku}(t-1)\,(1+\xi)+\text{add}\Bigg($$

$$\text{Pol}(\textit{Ulozky}_t, j)_1\,(1+\xi)^{\left(\dfrac{\text{CisloDne}(31,\,12,\,t)-\text{Pol}(\textit{Ulozky}_t,\,j)_2}{\text{DelkaRoku}(t)}\right)},$$

$$j=1\,..\,\text{nops}([\textit{Ulozky}_t])\Bigg)$$

$$-\,PoplatekZaVedeni\,(1+\xi)^{\left(\dfrac{\text{CisloDne}(31,\,12,\,t)-\text{CisloDne}(1,\,3,\,t)}{\text{DelkaRoku}(t)}\right)}$$

$$+\,\text{StatniPodpora}(t-1)\,(1+\xi)^{\left(\dfrac{\text{CisloDne}(31,\,12,\,t)-\text{CisloDne}(1,\,3,\,t)}{\text{DelkaRoku}(t)}\right)}\Bigg)$$

$$NasporenaCastka := t \to \text{`if`}(t < \text{Datum}(Pocatek)_3,\,0,$$

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

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

$$StavEkv := \tau \to \text{add}\Bigg(\text{`if`}\left(\tau < \text{Datum}(\textit{UlozkyEkv}_{i_2})_3,\,0,\,\textit{UlozkyEkv}_{i_1}\right)$$

$$(1+{}'\zeta'{}')^{\left(\dfrac{\text{CisloDne}(31,\,12,\,\tau)-\text{Pol}\left(\textit{UlozkyEkv}_{i_2}\right)}{\text{DelkaRoku}(t)}\right)},\,i=1\,..\,\text{nops}(\textit{UlozkyEkv})\Bigg)$$

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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Vynosnost v zavislosti na velikosti ulozek

```
> 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:
```
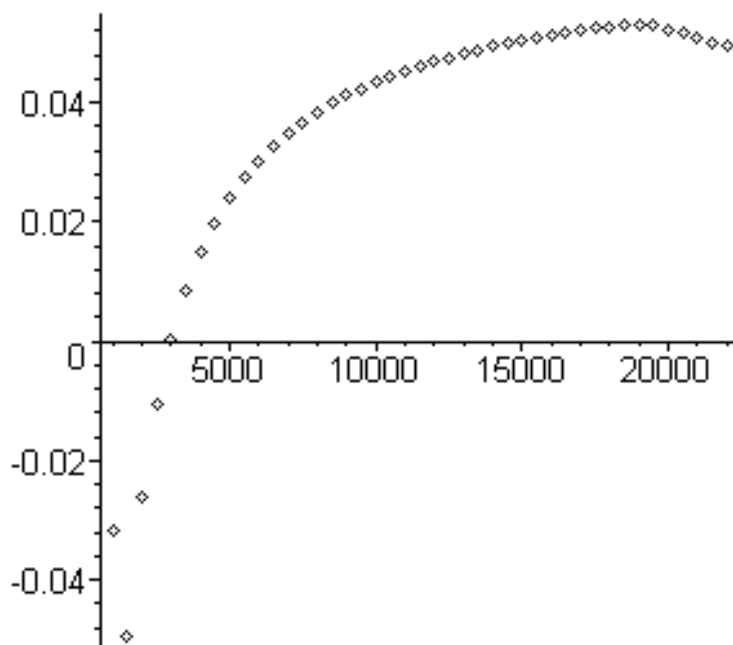
$$B :=$$

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


Vynosnost v zavislotsti 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:
```
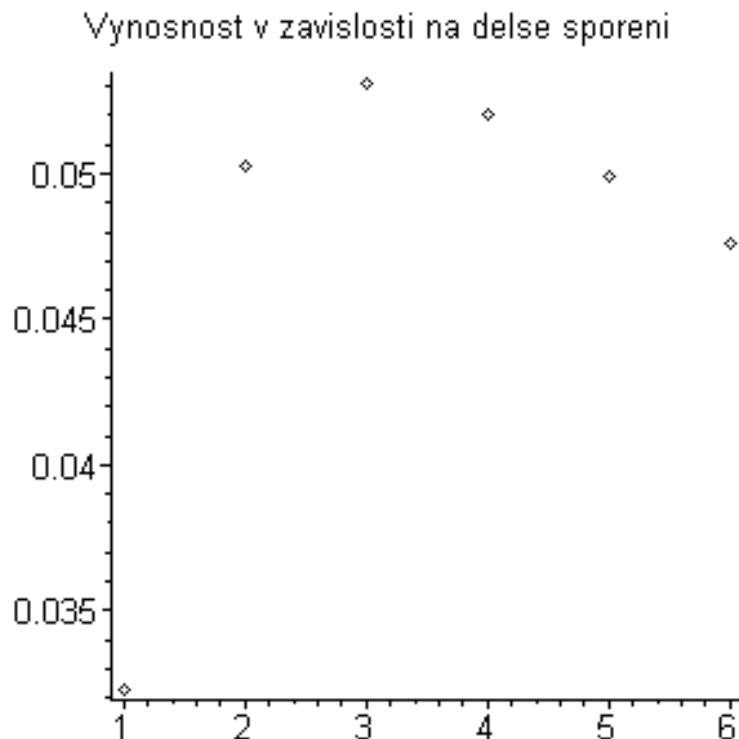$$C :=$$

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


Vynosnost v zavislosti na delse 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");
```

$$E :=$$

$$5$$

$$[6, 0.05081784075]$$

$$[7, 0.04748448685]$$

$$[8, 0.04485514718]$$
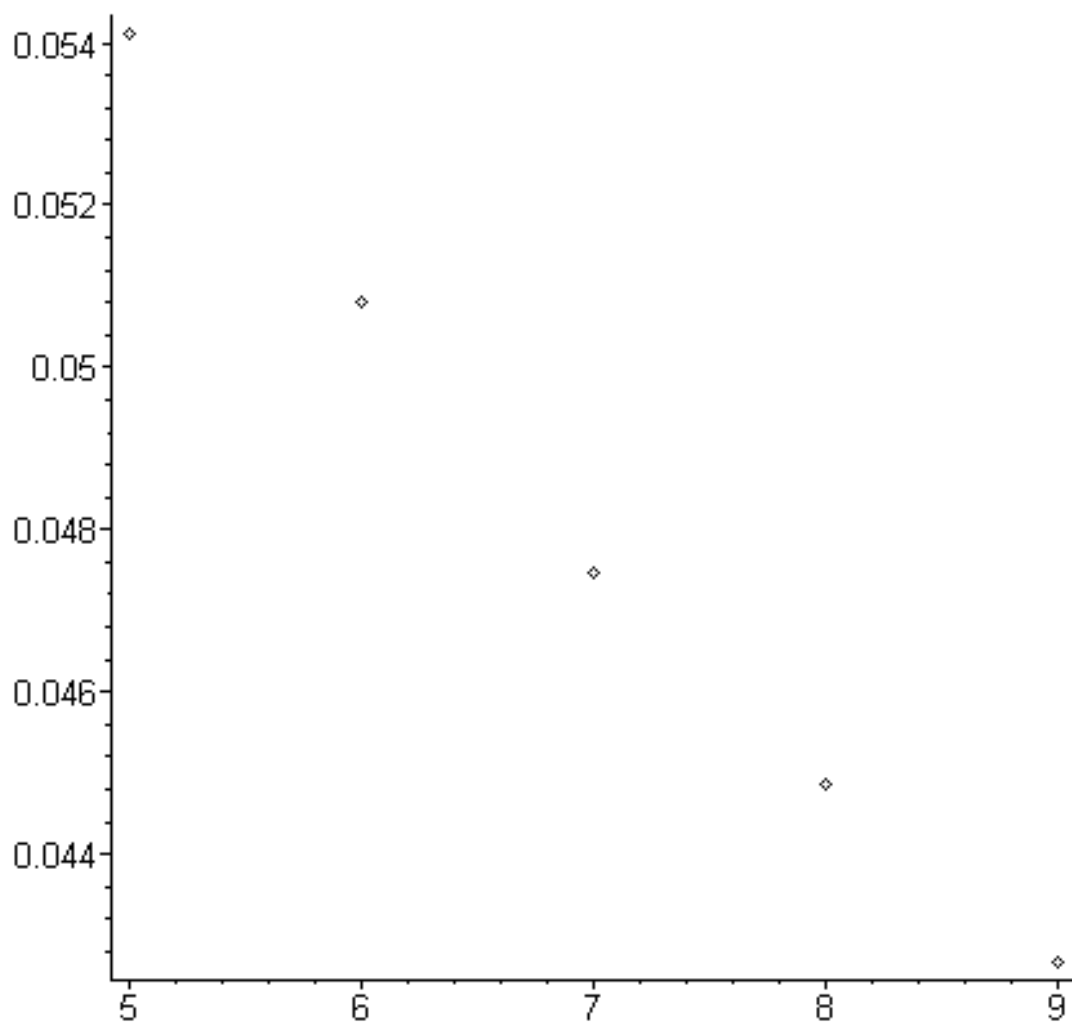
$$[9, 0.04268190454]$$

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);
```

$$NadN := x \rightarrow \text{`if`}(0 < x, x, 0)$$

```
> 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))));

>
```
$$PermutaceSOpakovanim :=$$
$$a \rightarrow combinat\text{:-}permute(\mathrm{op}(combinat\text{:-}choose(a, a)))$$

```
> 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);
```
$$[[1, 2, 3], [1, 3, 2], [2, 1, 3], [2, 3, 1], [3, 1, 2], [3, 2, 1]]$$

```
>
```